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# electron user

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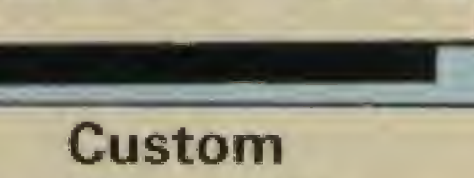

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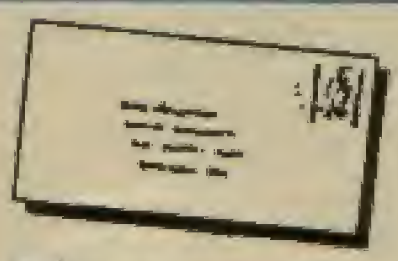

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electron user NEWS

# Electron users are power-hungry

**ELECTRON users are seeking much more power for their machines in ever-increasing numbers. A new survey has revealed that some 40 per cent have upgraded their machines over the last year.**

Of these the majority have opted for compatibility with the BBC Micro, so opening up a vast new potential library of software.

In most cases, the Electron buffs have spent more on the power boosting add-ons than they have on the micros themselves.

With firms like Slogger and Advanced Computer Products offering a variety of machine-extending routes such as sophisticated disc drives, interfaces, expansion roms and ram boards, the future of the Electron now seems assured.

"If companies like this hadn't shown their concern, the Electron may well have become completely extinct by now", observed Derek Meakin, managing editor of *Electron User*.

"But the Electron has always been an excellent machine. It's just that thanks to the ingenuity of some of the firms in the market, it is now that much better".

The run up to Christmas demonstrated clearly that people are not prepared to shelve their Electrons.

PRES, the company marketing the £99 Advanced Plus 3 disc upgrade for the machine, reported sales of 1,000 units a month.

"We just couldn't keep up with the demand", said a company spokesman. "We found ourselves working into the small hours trying to get them out.

"It seems to have really taken off as an ideal Christmas present".

## Support is still strong

**A POLL of companies in the BBC Micro market has shown that some 55 per cent have given active consideration to producing products for the Electron.**

**In all cases those interviewed admitted they had been surprised by the interest that still surrounds the Electron.**

**"You cannot ignore the continuing popularity of this machine", said John Huddlestone of Advanced Computer Products whose firm is now synonymous with the Electron scene.**

**"It's a very nice little market" he said.**

# ADVENTURE IS THE NAME OF THE GAME

*DRAGON-slaying wizards, maidens in distress and the Spirit of Adventure group will travel through time to transform the next Electron & BBC Micro User Show into a fascinating world of adventuring.*

*Goblins, demons, and all manner of mythical creatures have been taken out of the micro chip games world and brought to life.*

*The Spirit of Adventure group, which regularly meets to act out medieval quests, will be at the Renold Building, UMIST, Manchester, from March 18 to 20 disguised as minotaurs, zombies, wizards and goblins.*

*Visitors will get a chance to play the hero or heroine, battling against magical forces and monsters, under the guidance of some of Britain's top role-playing specialists.*

*The very latest in hardware and software will also be on display and, in keeping with the adventure theme, a treasure hunt is being held with prizes of the most popular fantasy games for the Electron.*

*An advice centre manned by experts will be available to help find solutions to some of the more complicated problems.*

*The Spirit of Adventure Group regularly meets at unusual locations to create a realistic illusion of fantasy.*

*They have ranged from medieval banqueting halls to overgrown woodlands. Even an old steel mill has been transformed for their journey back in time.*

*According to Steve Gibson, one of the group's founders, the Renold Building at UMIST "will prove a bit of a challenge, but with a little imagination and a lot of stamina visitors will enjoy the adventure of a lifetime".*

# A record again

ELECTRON supplier Superior Software doubled its previous record sales figures last year. And the company also doubled its yearly turnover for the third year in succession.

"We're going to try and do it again this coming year", said Superior's general manager, Steve Botteril.

"About 40 per cent of our sales were due to the tremendous support of the Electron market. We are committed to continuing to supply quality software for the machine as long as there is a demand".

Four new games scheduled should have the same impact on the market as Elite, says the company.

# Electrons move to the IT centre

STUDENTS learning information technology at Deyes High School in Merseyside have found the Electron a walkover.

In fact over 500 pupils completed a sponsored walk to raise the cash to buy 16 new machines and monitors.

The Electrons have now taken their place alongside a large collection of BBC Micros at the school's Information Technology centre.

To increase their flexibility the machines have been equipped with an ACP Plus 1 and an AP4 disc interface as standard.

"I have known for some time that the Electron was a great machine", said Russ Ellis, lecturer in Information Technology at Deyes High School.

"Having previously only used BBC Micros, some of the teachers were a bit apprehensive. But now they all agree that the Electron is an excellent computer to work with".

The machine has proved so popular that a number of children have bought their own in order to continue studies after school.

A large part of the IT course involves studies for the Cambridge information technology certificate. A thorough understanding of word processors, spreadsheets and databases is needed to qualify for the award.

All students also undertake a compulsory one-year course in computing. "The Electron is playing a vital part in equipping our pupils with the skills that they will need for a secure future", said Russ Ellis.

## Red ruse

*THE first computer game from Russia has infiltrated the UK via Hungary with help from Mirrorsoft agents.*

*Tetris is said to be easy to play, incredibly addictive – and almost impossible to explain.*

*Random shaped blocks appear in a box on the left of the screen, and you have to move and turn them to form a continuous line across the bottom of the screen in order to score points.*

*It may sound simple but if you are not fast enough the blocks on the left build up until they touch the top of the screen. When that happens the game ends.*

*Price £8.99 on cassette and £12.99 on disc from Mirrorsoft (01-377 4645).*

# Rhyming lessons

A CHILD-minding service has taken on six Electrons as members of staff.

The machines are being used to help look after youngsters under five years of age who attend centres run by the Birmingham Kiddy Care co-operative.

Marjorie Dixon, the director, bought the machines after she saw the *Electron User* Nursery Rhymes package.

"This was perfect for what we wanted," she said. "For it would not only keep the children happy but they would also learn at the same time.

"And the mothers who leave their children here when they go off to work are delighted with it all".

The Nursery Rhymes software offers old favourites such as Humpty Dumpty and Jack and Jill as part of a learning environment.

"Since the computer arrived, my four-year-old's spelling has come on in leaps and bounds", reported one happy mum.

"I've always hated computers before – only thinking of them as things that screwed up monthly bills – but this has made me view them in a completely different light".

# THE GALLUP CHART TOP 10

ELECTRON SOFTWARE

| THIS MONTH | LAST MONTH | TITLE (Software House) | PRICE |
|---|---|---|---|
| 1 | 2 | AROUND THE WORLD IN 40 SCREENS *Superior* | 6.95 |
| 2 | 3 | PAPERBOY *Elite* | 9.95 |
| 3 | 1 | SOCCER BOSS *Alternative* | 1.99 |
| 4 | • | LIFE OF REPTON *Superior* | 6.95 |
| 5 | 5 | SUPERIOR COLLECTION VOL 2 *Superior* | 9.95 |
| 6 | 4 | FOUR GREAT GAMES *Micro Value* | 3.99 |
| 7 | 7 | TRIPLE DECKER *Alternative* | 1.99 |
| 8 | 6 | CODENAME DROID *Superior* | 9.95 |
| 9 | • | SPELLBINDER *Superior* | 9.95 |
| 10 | • | MICROBALL *Alternative* | 1.99 |

*Compiled by Gallup/Microscope*

There are three new entries in this month's chart – two new releases from Superior and another new one from Alternative. This means that two Repton games are in the Top Five – Around the World in 40 Screens and the new Life of Repton.

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| Superior Collection Vol III (plus 3 disc) | ~~£14.95~~ | £11.95 |
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By Pendragon

# Old wine in new bottles

**THIS month sees the re-release of some old adventures in new packaging and at bargain prices.**

The US Gold collection of nine games on one disc or tape is an offer not to be missed. The adventures include Voodoo Castle, Pirate Adventure, Strange Odyssey, Temple of Terror and Buckaroo Banzai.

The package is made good with four old Ultimate arcade-adventures. Retailing at about £18 for the complete collection this must be worth considering.

Meanwhile, Adventure Soft's Scoops, with four adventures packaged on one tape for only £7.95, is also an essential buy.

Those of you who have a Slogger Master Ram board and SEDS or an ACP Plus 4 fitted to your Electron may be interested to learn that Topologika has re-released revamped 5.25in disc versions of the Acornsoft greats, Philosopher's Quest and Countdown to Doom.

These classics have been given extra locations and atmosphere to make them worth looking at, even at £17 each.

In the final stages of preparation is Geoff Larsen's sixth adventure, Hex, which should be on general release very soon.

At Robico, Glen MacCauley is editing Communion, which is part two of The Village of Lost Souls trilogy, and promises to be an absolute blockbuster.

The new Elk Adventure Club release, The Axe of Holt, is also due out this month. If it follows the tradition laid down by Magnetic Moon and Starship Quest, it will be an essential buy.

However, all is very quiet at Shards. I know many of us have been waiting for almost two years for the release of a sequel to Woodbury End. So how about writing to Steve Maltz letting him know that such a sequel would be greeted with shouts of glee from all corners of the Electron software-buying public.

R. Forster of Hale is the first person to contact me to say he has discovered the word Pendragon at a hidden location in Suds.

I have forwarded his name and address to Riverdale Soft and he can expect to receive a complimentary copy of American Suds upon release.

I mentioned last month that 1987 was an exceptional year for adventure releases for the Electron. The quality of software for our machine has never been higher, and this is borne out by the phenomenal array of top notch adventure games in the most recent top twenty.

Remember that these charts are compiled purely from your votes for your favourite adventure games.

It's good to see the two new Robico releases feature so prominently in the chart. I have received a lot of mail praising the quality of these two masterpieces, and surely they are now the yardstick by which all other adventures must be judged.

It is also pleasing that small companies such as Larsoft and Riverdale are producing adventures which readers so obviously enjoy. This can only be healthy for the market in general and Electron users in particular.

With a flood of new releases due in the coming months, the next chart should present quite a different picture.

## READERS' TOP TWENTY VOTES

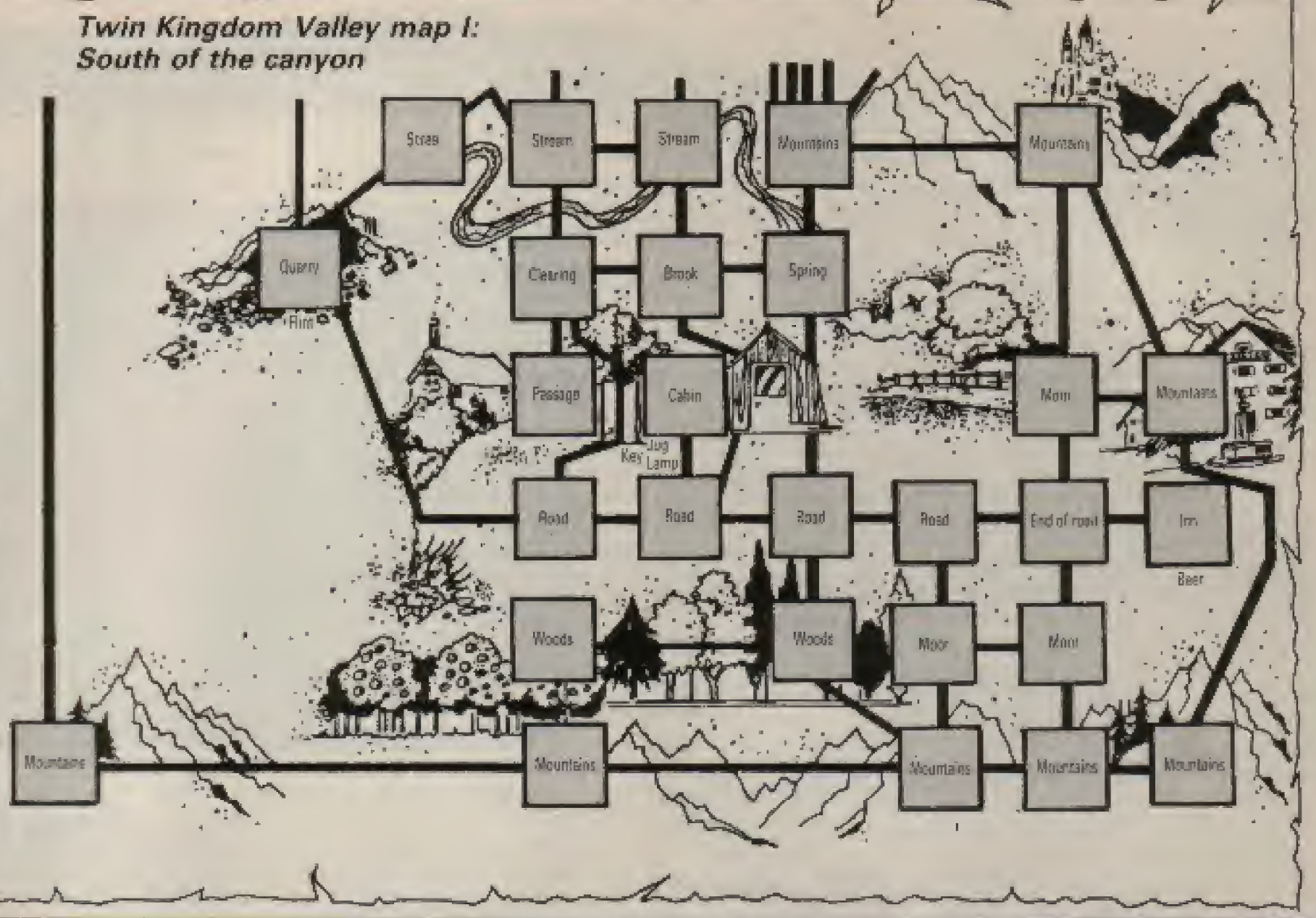
| | | | |
|---|---|---|---|
| 1 | The Hunt | Robico | 93% |
| 2 | Village of Lost Souls | (Robico) | 92% |
| 3 | The Lost Crystal | Epic | 90% |
| 4 | Oxbridge | Tynesoft | 86% |
| 5 | Dodgy Geezers | Melbourne House | 84% |
| 6 | Myorem | Robico | 83% |
| 7 | Kayleth | Adventure Soft UK | 82% |
| 8 | Rick Hanson | Robico | 81% |
| 9 | Wheel of Fortune | Epic | 80% |
| 10 | The Ket Trilogy | Incentive | 78% |
| 11 | Twin Kingdom Valley | Bug Byte | 77% |
| 12 | The Puppet Man | Larsoft | 76% |
| 13 | Woodbury End | Shards | 74% |
| 14 | The Nine Dancers | Larsoft | 71% |
| 15 | Philosopher's Quest | Acornsoft | 70% |
| 16 | Quest for the Holy Grail | Epic | 69% |
| 17 | Suds | Riverdale | 68% |
| 18 | Terrormolinos | Melbourne House | 67% |
| 19 | Magnetic Moon | Elk Adventure Club | 66% |
| 20 | Project Thesius | Robico | 63% |

## Adventurer's Glossary

(continued from last month)

**Dagger:** A handy weapon, but usually with some limitations of use.
**Dark:** Always at some point in an adventure, so you will need a light source.
**Desert:** Features in many adventures, and often a maze. Be sure to have a plentiful supply of something to drink before you venture on.
**Desk:** Always worth examining, and try opening the odd drawer.
**Diamond:** Invariably a treasure.
**Ditch:** Often a trap, so beware. It may need crossing so look for a bridging point.
**Doll:** Unlikely to be ordinary, probably a voodoo doll.
**Dragon:** Kill it, but examine its corpse once it is dead.
**Drink:** Essential to survival. Water is usually safe, but avoid Ale and other potent or enticing liquors.
**Dwarf:** Almost always hostile; best to kill and ask questions afterwards.

***Twin Kingdom Valley map I: South of the canyon***




## Readers' Hall of Fame

***The Puppet Man*** – *Geoff Livesey* (continued from last month)

Go East and talk to the muse, then S, S, W, enter the willow and talk to Pierrot. E, E, S, W, S, get the candle, N, E, E and enter manor. UP, N, get the glove, examine the shelf and read the note.

S, DOWN, LEAVE, go onto the stage and talk to the juggler. He will be distracted and drop one of his clubs. get it, jump down, W, S, S, S, W, S. A man will rush off to the west.

Now you can go W, W, W. Drop the club, setting off the trip wire. S, S, W, S, E, into the clown's house. Examine the fireplace, wear the glove and get the poker.

W, N, W, into the tavern. Examine the fire and poke the cinders. Still wearing the glove, get the black key. It will soon cool and you will no longer need to wear the glove.

E, S, E, and light the candle from the clown's fire. W, N, N, UP, enter the door, unlock Pierrot's desk and get his poem. ENTER DOORWAY, DOWN, S, E, N, N, E, E, E, N, E, N, N, N, E, and go onto the stage again. Give the poem to Columbine.

Now jump down, W, N, N, N. Erato will advise you to examine the stump. Get the marionette, S, S, S, S, E, into the Inn. Give the marionette to the Puppet-Man.

***Kayleth*** – *Robert Henderson* (continued from last month)

Go to the shelf where you found the suit and get the bar and cube. Go and get the lenses and the pyramid which is on floor three.

Leave the building and continue until you are in the forest by the Mokki Ray, then spin the bar. Climb the tree, wear the lenses and flip the knot. Take the tablet and examine it, this will give you the AZAP CODE AKN. Go to the AZAP chamber and type AZAP CODE AKN.

Break the tablet which should leave you a rod. Go to the Citadel and you will be surrounded by Zemps. Spin the rod to scare the Zemps. Once you enter the building, type GO SOCLE and a voice will reply, "To be with me, drop the silver three". Now drop the pyramid, cube and rod, and the Socle will descend.

Take the mortar and pod and GO SOCLE. Get the dime and go back to the AZAP chamber and type AZAP CODE ELY. Now you must go back to the city, pay Broznak with the dime and get the bottle of water.

Examine the furniture to find Yurek and give him the rod, then take him to the steel dome. Return to the AZAP chamber and type AZAP CODE EPO. Insert your plasma beam cartridge and fire the beam at the wall. Go back once again to the chamber and type AZAP CODE ELY.

Travel to floor 3 and INSERT YUREK INTO INDENTATION. You will now transform into Yurek. Get the ball and mortar and return to the AZAP chamber. Type AZAP CODE EPO, leave the chamber and go South.

Insert the ball into the icon and when you see the Atech technician, give him the mortar. He will give you a bulb. In the chamber, type AZAP CODE ELY. Get the water, plant the bulb in the compost and water it.

Wait for a few moves and a flower will grow. Take this and drop it in the mortar. You now have essence of tae which can be used to kill Kayleth.

In the AZAP chamber, type AZAP CODE DHT. You will be transported to the control room of Kayleth's starship. The code to open the door is an anagram of all the AZAP codes: ELY, ROO, AKN, EPO and DHT. You should decode this to OPEN KAYLETH DOOR.

To kill Kayleth and finish the game, drop the tae in the pool.

***Enthar Seven*** – *The Boss* (continued from last month)

Equip yourself with the space helmet, oxygen cylinder, spherical sweet, pliers, hammer and torch, then set the teleport to take you to sector three. Once you enter you

***Turn to Page 10*** ►

◀ From Page 9

will find yourself in a confusing forest maze with illogical exits.

By careful mapping using the drop technique you will soon be able to chart nine different locations. One of these is a clearing which leads to a teleport booth and another will reveal a flipper plate if you move the leaves.

Stand on the flipper plate to be transported to an elevated walkway in the treetops. You must now attach the cylinder to the helmet and wear it unless you want to suffocate in the rarified atmosphere.

A quick reconnaissance will lead you to discover three chasms which appear at first to be uncrossable. However, the crevice at the end of the east bound catwalk can be traversed by swinging on the creeper.

On the other side you will find a plank of soft wood which can be used to bridge a gap on three separate occasions before it breaks. However, the drop at the edge of the west bound walkway can be safely jumped without resorting to using a bridge, and a large fan can be retrieved.

The gap to the north of the ramp must be bridged using the plank. At the other side a complicated manoeuvre is involved. If you examine the sweet you will discover it is 15cm in diameter.

The doorway to the tree has an ingenious locking device involving a funnel 9cm in diameter. You need to suck the sweet and examine it regularly until its diameter matches that of the funnel. Now insert the sweet into the funnel and the door will swing open.

You will soon meet a spider with a venomous bite, but don't worry it's only a nightmare.

## Problems Solved

Superior Software's graphic adventure **Stranded**, now being offered at a bargain price, is being discovered anew by many other adventurers and consequently causing a number of familiar problems.

Robin Cornelius asks how to get through the air lock inner door. Simply pick the lock, Robin.

Mark Patterson is puzzled by the fuel capsule and time crystal. You must drop the crystal in the slot in the large control room. Similarly, the fuel must also be dropped in a slot.

Mark is also stuck in **Circus Adventure**. He has activated the generator, but doesn't know what to do next. I suggest you syphon some fuel for your car, Mark.

Ewan McPherson is having difficulty escaping from the whale's stomach in **Philosopher's Quest**. You need to light a match and travel in the opposite direction to the smoke to find the exit.

Mark Hilton needs to follow the paved path off the old side street in Witherton to discover the cottage garden in **Project Thesius**. While Duggie MacDonald should strike a match to give the serpent heartburn in **Sphinx Adventure**.

I must thank Robert Henderson for a copy of **Eye of Zoltan**. It has enabled me to help Trevor Hicks and others to open a few doors. You need a bunch of keys and a password to establish the rights of way.

Finally I must thank James Mottram for his extensive hint sheets for **Dodgy Geezers** and Elizabeth White for the enormous help she has given so freely.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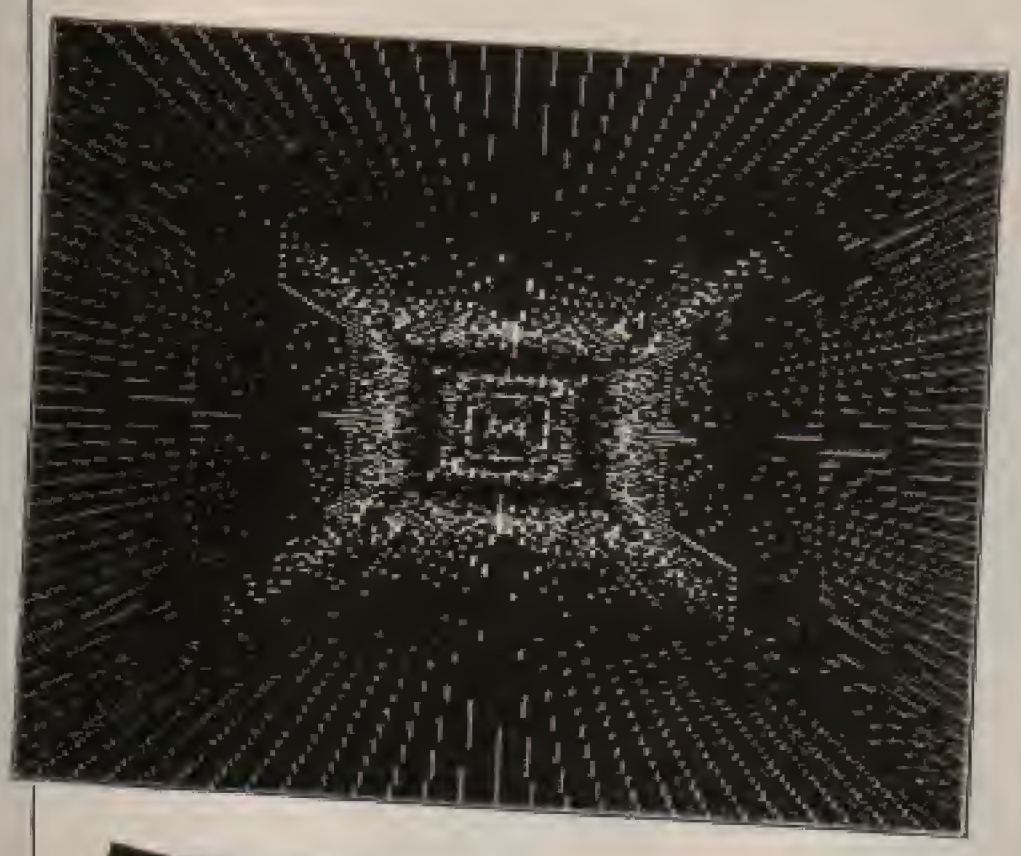
# 10 LINERS

# PALETTRONICS



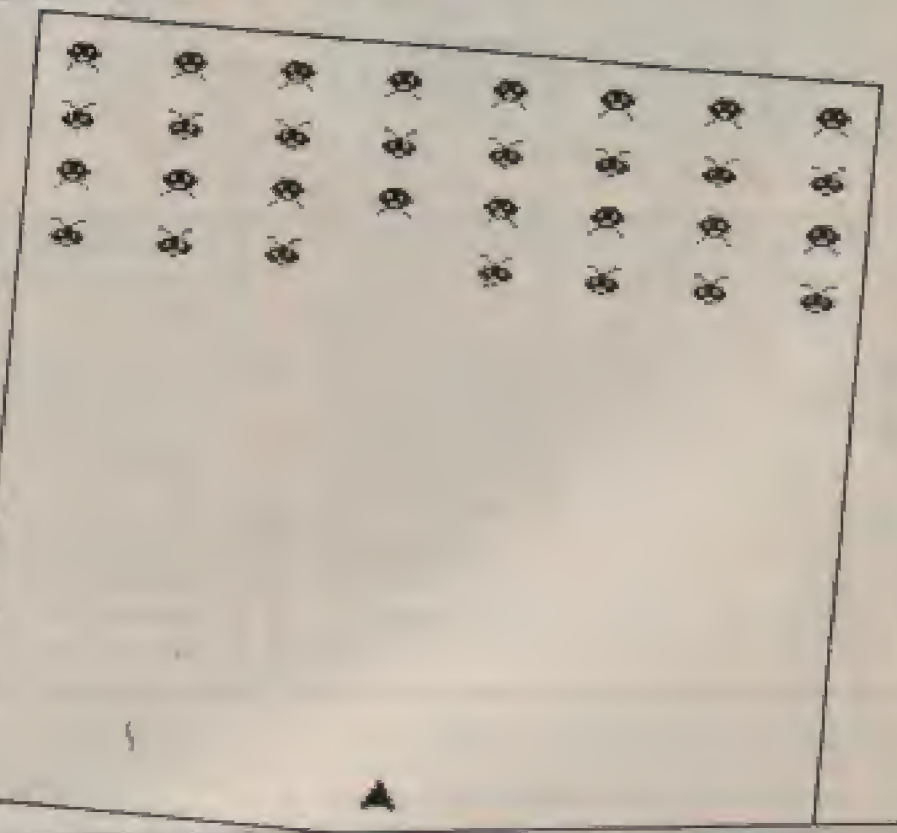
SPECIAL effects caused by changing the palette always prove popular, and this quickie from Arthur Stone is no exception.

Apparently Arthur first wrote Palettronics for the Spectrum, but as the effects could only be achieved with machine code he says it really came into its own after being re-written on the Electron – in Basic!

Get your sunglasses on before running it.

```
   1 REM Palettronics
   2 REM By Arthur Stone
   3 REPEAT:MODE2:VDU23;8202;0;0;0;:FORY%=0TO2:COLOUR13
5:COLOUR0:PRINTTAB(3,Y%)STRI
NG$(14," "):NEXT:PRINTTAB(4,
1)"PALETTRONICS":T%=0:FORX%=
0TO1279STEP8:GCOL3,T%MOD6+1:
MOVEX%,0:DRAW1279-X%,927:T%=
T%+1:NEXT:FORY%=0TO927STEP4:
GCOL3,T%MOD6+1
   4 MOVE0,Y%:DRAW1279,927-
Y%:T%=T%+1:NEXT:REPEAT:FORX%
=0TO5:FORY%=1TO6:VDU19,Y%,(X
%+Y%)MOD6+1,0,0,0:NEXT:NEXT:
UNTILINKEY(-99)
```

# ALIEN INVASION



SPACE invaders in 10 lines? You bet. While looking a touch daunting at just over 1k of machine code, this great little program from Richard Evans really shows what can be done with the minimum of code.

Use Z and X to move your laser base left and right and Shift to fire. After you have lost a game, the Electron will pause and wait for the spacebar to be pressed before starting a new one.

Type in the first line exactly as shown, complete with abbreviations, or it will not be accepted into the program. Unfortunately there was not enough space for a sophisticated checksum routine, but you will be told if there is a typing error in the data lines.

```
   1MO.4:P.TAB(13,10)"PLEAS
E WAIT...";:ST%=&3000:CK%=0:
F.L%=0TO8:READL$:F.L1%=1TOLE
NL$-1S.2:V%=EVAL("&"+MID$(L$
,L1%,2)):?ST%=V%:CK%=CK%+ST%
*V%:ST%=ST%+1:N.:N.:IF.CK%<>
&54024242 P."ERROR!" ELSE P
.TAB(10,10)"PRESS SPACE TO P
LAY";:CALL&3000
   2DATA 20D432A91F8DC5092D
5A3D2096302003018006203F3000
214C0E30A9E08550A9338551200E2
3218ADC509C93FF00569088DC509
2004324C0838200432AC0330CECB
0918154904BDCB09A9008DC904D
C809F0034C0C304C073160AEC5B9
8EC709A9019D8009D020339D0009
BD0833904009CA10
   3DATA ECA9008DCA098DC809
A9138DC009A91F8DC109A9048DCB
0949F2855DA9328551 4CE232ADC5
098DC609AEC609BD8009F012BC40
09B9A03348BD0009AA20C7326820
EEFFCEC60910E160ADCA09F00340
5431ADC5098DC609AEC609BD8009
F02EBC4009BD0009AA20C7324920
20EEFFAEC609DE00
   4DATA 09BD0009D005A9018D
CA09BDAB3348BD0009AA20C73268
20EEFFCEC60910C51860ADCA09F0
034C5431ADC5098DC609AEC609BD
8009F030C4009BD0009AA20C732
492020EEFFAEC609FE0009BD0009
C927D005A9018DCA09BDAB33483D
0009AA20C732682 0EEFFCEC60910
C3186 0A90140C809
   5DATA 8DC809A9008DCA09AD
C5098DC609AEC6090D0009F033BC
4009BD0009AA20C732A9202 0EEFF
AEC609FE4009BD4009C91FD005A9
018DC909BC4009BDAB33489D0009
AA20C732682 0EEFFCEC60910C0AD
C909D002186 03860AEC009ACC109
20C732A9E220EEFFADC009F02CA9
81A29EA0FF20F4FF
   6DATA EBFFD01FAEC009ACC1
0920C732A9202 0EEFFCEC009AEC0
0920C732A9E220EEFF4C1F32ADC0
09C926F029A981A2BDA0FF20F4FF
E0FFD01CAEC009ACC10920C732A9
2020EEFFEEC009AEC00920C732A9
E220EEFF4DC409D020A981A2FFA0
FF20F4FFE0FFF0021860ADC00980
C209ADC1098DC309
   7DATA A9018DC4094EC209AC
C30920C732A92020EEFFCEC309AD
C309D007A9008DC4091860AEC209
ACC30920C732A9E520EEFFADC509
8DC609AEC6090D8009F043ADC209
D00049D03BADC309D04009D033A9
009980098DC409BC4009BD0009AA
20C732A5202 0EEFFAEC209ACC309
20C732A92020EEFF
   8DATA A90720EEFFCEC70910
023860186 0CEC60910B01860A91F
20DEFF8A20EEFF984CEEFFA9B1A2
9DA0FF20F4FFE0EFD0F360A000B1
50C92AF00720EEFFC84CE4326016
0417E03C7ED8FF663C428117E1C3
24187ED8FF661817E218183C3C7E
7EFFC317E30808080808080B17
000A2000000000000
   9DATA 0011001 1072A000306
090C0F12150003060 90C0F121500
0306090C0F12150003060 90C0F12
150003060 90C0F12150003060 90C
0F12150003060 90C0F12150003060
090C0F12150000000000000002
0202020202020204040404040404
0406060606060606080808080606
0608080A0A0A0A0A
   10DATA 0A0A0A0C0C0C0C0C0C
0C0C0E0E0E0E0E0E0E0E0E0E0E0E
E0E0E0E0E0E1E1E1E1E1E1E1E0E0
E0E0E0E0E0E0E0E1E1E1E1E1E1E1
E0E0E0E0E0E0E0E0E0E0E1E1E1E1
E1E1E0E0E0E0E0E0E0E0E0E0E1E1
E1E1E1E1F0A0D11B711005720452
04C204C202020442 04F204E2045
20212A202044204F
```

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DISC DRIVE COMPATIBILITY AT LONG LAST' (Electron User June 86) this sums up AP4 & ACP's approach to producing products AP4 is a fully ACORN compatible disc I/face & will accept any standard drive inc PSU runs 1770 DFS (as fitted in the B + & Master) keeps page &Eee, utils in ROM & provides a spare rom socket. ACP's PLUS 4 comes out on top I can recommend it to anyone (E.U June 86)

AP4 should be considered the standard interface for the Electron (AU July 86)

| | |
|---|---|
| AP4 100 | £199.00 (inc VAT & Securicor delivery) |
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# Red-hot sequel

*Product: Plan B2*
*Price: £1.95*
*Supplier: Bug-Byte, Victory House, Leicester Place, LONDON WC2H 7NB*
*Tel: 01-439 0666*

SEVEN months after *Electron User* awarded Plan B the title of Golden Game, Bug-Byte has released its red-hot sequel called, surprise, surprise, Plan B2. So what novelties are in store for hardened fans of the original game?

Well, at first sight not a lot seems to have changed. To my disappointment there is still no use of colour, but I hadn't really expected Bug-Byte to have been able to do this and keep all the different characters moving around at the same incredible speed.

The plot on the inlay card looked familiar – which wasn't surprising, as it is identical to that of it's predecessor. As plots go, it still holds up as a fairly decent scenario.

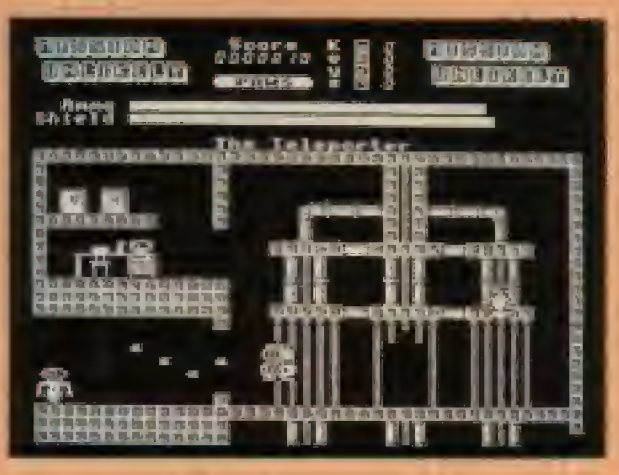
You are in control of a single war drone. Your job is to explore the Togrian Computer Complex, find and destroy all of the computer's parts, and escape intact.

This objective is complicated by the fierce and persistent security robots which patrol the complex's many rooms. Nasty beasts, these – they can fire two dozen rounds of laser bolts quicker than you can say microprocessor.

Your drone is fully equipped with a rapid-fire laser, but your ammo is limited. Replacement stocks can be found in various locations, usually guarded by more security guards.

You have a shield, too. This will absorb quite a number of enemy laser bolts, and you can even ram the security robots, causing them to disintegrate in a most undignified manner. Be careful, though, as repair kits for your shield are difficult to find.

In your search through the complex's many rooms careful thought is required to reach your objective. Some walls block your targets, making them appear seemingly unreachable. That is, until you realise that they will disintegrate under fire.



Not all walls are this obliging. Some have hidden weak spots which you must find quickly while the robot guards are doing their level best to vapourise your shields.

There are sliding doors which can't be opened by anything short of a key. The keys are found dotted about, usually in the most awkward places, and come in four different types. It is most frustrating to battle your way up to a strategic door only to find the wrong key is in your sweaty clutches.

Oilcans and spanners sprinkled around the complex will replenish your shields, although more than once I was needlessly obliterated while trying for an unnecessary top-up.

The security robots are the bain of your life. No sooner has a whole batch been satisfactorily polished off – to the accompaniment of some very good sound effects – than an even larger horde materialises, drenching your drone in shield-depleting rocket fire.

This makes your quest to destroy the complex become almost secondary to hunting down the elusive cans of re-vitalising oil and searching out the odd pain-relieving spanner.

Upon being vapourised at the end of a fruitless game, you may object to the message that "You appear to have snuffed it", which is painfully obvious. But it's fun, all the way through.

The controls are identical to the original Plan B, as has been everything described so far. So now to the differences:

Firstly, in the original game your drone could only wander over black backgrounds. In B2 a most amazing scenery-masking technique is employed, allowing you to drift over

pillars, up walls and through certain floors.

Plan B had fairly nice-looking large sprites which were not animated. The sequel features extremely detailed lovingly-crafted beasties, all of which are animated in some fashion. They tend to be smaller though, to allow for more speed.

One annoying feature of Plan B was the bullets. These flickered at times. In Plan B2 however, not only is every single object 100 per cent flicker-free, but the whole game is faster than the original.

Although in black and white, Plan B2 exudes quality and craftsmanship, from the high-resolution metallic-looking sprites to the textured background of the computer complex.

Nothing seems to have been wasted here – every ounce of speed has been wrung out of the game, and at the expense of nothing whatsoever. I ran Plan B2 on both a BBC Micro and a Master 128, with neither being any faster at all than my Electron.

Generally, all sprite movement has been improved immensely. You can have no real idea of just what this means until you see the game in action. It is probably the best showcase of what your Electron can achieve that I have ever seen.

**Chris Nixon**

| | |
|---|---|
| *Sound* | *10* |
| *Graphics* | *10* |
| *Playability* | *10* |
| *Value* | *10* |
| *Overall* | *10* |

# Good clean fun

*Program: Bonecruncher*
*Price: £9.95 (cassette), £11.95 (5.25in disc), £14.95 (3.5in disc)*
*Supplier: Superior Software, Regent House, Skinner Lane, Leeds, LS7 1AX.*
*Tel. 0532 459453*

IN Bonecruncher you play the unlikely part of Bono, a cute little green dragon who lives in a castle by the sea. As an enterprising soul, you have set up Bono's Bathing Company making soap, a commodity prized by the monsters who bathe in the moat.

As everyone knows, real soap is made from bones. So to keep the customers happy you must collect the skeletons littered around the castle and boil them up in your cauldron. This turns them into luxurious skeleton soap.

However, the castle is anything but a safe place. There are trapdoors through which you can disappear without trace. On top of this, some of the skeletons are not yet skeletons – they're live and very deadly monsters, with an insatiable appetite for little green dragons.

A further hazard appears in the shape of giant spiders that rush around the walls biting any hapless dragons in their path. These will also eat any bones they find. You must race the spiders to collect the skeletons before they do.

The castle is also inhabited by Glooks, large creatures who love the smell of soap. When you have climbed up a stairway to supply another customer with a bar of soap, they will – after a short delay – all move in the direction faced by this stairway. Although a Glook is not in itself harmful, it will crush you if you get in its way.

An added problem is that you may find yourself, or the way forward, blocked by Glooks if you are unfortunate enough to take a bar of soap up the wrong stairway. However, you can push them or take advantage of the direction in which they are trying to move to suffocate monsters and turn them into skeletons.

Fortunately, Bono's Bathing Company is not a one-man show. Your partner Fozzy, is the brawn of the operation, strong enough to hold monsters and spiders at bay. He's not very bright however, and you must keep an eye on him to make sure he is not trapped or wandering in circles.

Bonecruncher is similar in appearance to Superior's classic Repton, with smooth four-directional scrolling and fiendish puzzles. However, the two games are quite different.

The addition of Fozzy and the

Glooks brings an entirely new dimension to the game, not the least of which is that the Glooks' movement causes the layout of each chamber to change repeatedly around you.

The humour in Bonecruncher is probably its most appealing aspect. The skeletons grin at you and tap their feet expectantly, and if you stand still for more than a few seconds Bono will start to yawn and stamp his foot impatiently. The monsters are also beautifully animated, jumping up and down showing a mouthful of teeth.

Bonecruncher will delight game players of all ages – another sure-fire hit.

**Hac-Man**

| | |
|---|---|
| *Sound* | 9 |
| *Graphics* | 9 |
| *Playability* | 9 |
| *Value for money* | 9 |
| *Overall* | 9 |

# Another brick in the wall

*Product: Trapper*
*Price: £1.50 (cassette)*
*Supplier: Blue Ribbon Software, CDS House, Beckett Road, Doncaster DN2 4AD.*
*Tel: 0302 21134*

THE aim of this budget arcade game is to trap monsters by pushing brick walls around to box them in and finally to squash them.

The title screen is typical of Blue Ribbon – simple and quick to load. There isn't a demonstration mode, so the game flicks between a list of control keys and a high score table.

On starting you are asked to input the difficulty level from one to six. This controls the monster's speed. One is slow and six is fast. I found the slowest speed quite fast enough for me.

The screen consists of a pile of bricks enclosed in a large box. Inside the box are you and a monster, which obviously considers you to be a rather tasty tit-bit. Fortunately you are a strong chap and can push the bricks

around quite easily. The monster can't push the bricks, nor can it pass through them.

So by pushing them round and piling them up you can eventually trap it (if you're lucky and can avoid it for long enough). Having done this, you then push a brick into it and squash him flat.

Screen two is pretty much the same as screen one, except that you now have two monsters to contend with – double trouble. The game now starts to get a bit hectic as you try to trap both. While you're concentrating on one, the other is sneaking up behind you.

Screen three brings three monsters, and four brings four. The final two rooms only have four monsters, but another is born immediately you trap and squash one.

On top of all this, there is also a time limit. A clock in the top-right corner of the screen slowly ticks away. If it reaches zero before you've trapped and squashed all the monsters you die and loose a life.

Although the game has a very simple theme, it is difficult, frustrating and challenging enough to make it highly addictive. The devilish grin on the faces of the monsters is a nice touch and it all adds up to a fun game that doesn't cost the earth. This is recommended.

**Roland Waddilove**

| | |
|---|---|
| *Sound* | 5 |
| *Graphics* | 6 |
| *Playability* | 9 |
| *Value for money* | 10 |
| *Overall* | 8 |

# Use the force, Luke!

*Product: Star Wars*
*Price: £9.95 (cassette)*
*Supplier: Domark, 204 Worple Road, London SW20 8PN.*
*Tel: 01-947 5622.*

SEVERAL years ago Atari released a coin-op arcade game based on that most famous of space adventure films, Star Wars. Employing fast moving vector graphics it was an instant success. Domark have now released a version for the Electron.

As in the original game, the action is divided into three scenarios – dogfight in space, through the towers and down the trench. These scenes are repeated with increasing difficulty as you proceed through the game.

Scene one is based on Luke's dogfight in space en route to the Death Star. The Empire's Tie-fighters zoom in at high speed, launch laser bolts, then veer away.

Using the four direction keys you steer the fighter's gunsights over the laser bolt and fire. The same tactics also work with the fighters, but the bolts must be your main priority. Each hit you sustain destroys one of your shields – you begin the game with six. Lose every shield and the next hit will destroy your fighter.

If you survive the dogfight you are transported to the surface of the Death Star (though not on level one). Here you begin a strafing run through a forest of laser-firing defence towers.

I found this to be the easiest of the three scenes. By swinging your sights slowly left and right while pressing the fire button you can destroy all towers and laser bolts in your path without sustaining a hit.

The final scene is set in the trench. To destroy the Death Star you must travel its full length and accurately blast the exhaust port at the far end. Success is rewarded with an exploding Death Star.

On level one the only hazards in the trench are laser bolts – you can avoid these by flying high and left, only venturing down into the trench at the very end to zap the exhaust port.

Unfortunately these tactics don't work on the higher levels, where the trench is criss-crossed by barriers – these must be flown over or under.

Unfortunately although Star Wars sounds attractive, the graphics are chunky (Mode 5), monchrome and at times, poorly defined. The gameplay is very sluggish and the controls are slow to respond. On top of this you have to sit though a 20k loading screen before the game starts to load.

All this adds up to a pretty dull, unexciting fare. I would advise you to try before you buy.

**Nev Astly**

| | |
|---|---|
| *Sound* | 3 |
| *Graphics* | 4 |
| *Playability* | 5 |
| *Value for money* | 5 |
| *Overall* | 5 |

# High flyer

*Product: Spitfire '40*
*Price: £9.95 (casette)*
*Supplier: Mirrorsoft, Athene House, 66-73 Shoe Lane, London EC4P 4AB.*
*Tel: 01-377 4645*

ALL you lovers of those old World War II films can now train to become top fighter pilots with Spitfire 40, a new flight (or should that be fight) simulator from Mirrorsoft. With plenty of practice, skill and just plain good luck, you can rise to the rank of Group Captain and be decorated with the VC, DSO and DFC.

On starting, you are presented with five pilots' names from which you must select one. A log book for the pilot is then shown. This displays his name and rank, the number of flying hours clocked up, the number of victories and any medals awarded. I was disappointed not to be allowed to enter my own name here.

Finally, a menu is printed which shows the three game option. The first is a practice run which enables you to concentrate on learning how to fly the Spitfire without the worry of being shot at by enemy planes.

A successfull landing adds the flying hours to your log. Once you've clocked up enough hours and feel fairly confident of your ability to fly you can try your hand at aerobatics in preparation for combat.

Combat practice places you in a situation where you can try out your technique. In this mode, crashing or being shot down does not count against you on your log.

Once you've had enough of this, you can move on to the real thing – air to air combat. First you are given your mission instructions. These tell you how many enemy planes there are and where they are situated in relation to the runway.

When airborne, you can have a map of the area you are currently flying over displayed on-screen. The enemy planes' positions and their heights are also indicated.

My favourite part of the game is the dogfight. I found it difficult to hit the enemy at first as it takes about a second for the shots to reach their mark.

Overall, the game is fairly easy apart from landing the Spitfire. The dogfights can be quite tense a  l the first time you shoot down an enemy aircraft you get a real feeling of achievement.

The instruction manual is clear and tells you all you need to know about the game. Not only that, it also gives you a brief, but interesting, background history to the Spitfire and includes a small bibliography of books for anyone wishing to learn more about this great aircraft.

The one thing I found lacking was that almost undefinable something which makes a game addictive. I enjoyed playing it for short periods, but it isn't one of those I would automatically reach for when sitting down for a gaming session.

**Desmond**

| | |
|---|---|
| *Sound* | 6 |
| *Graphics* | 6 |
| *Playability* | 6 |
| *Value for money* | 6 |
| *Overall* | 6 |

# Winter Warmer

*Program: Winter Olympiad 88*
*Price: £9.95*
*Supplier: Tynesoft Computer Software, Unit 3, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE.*
*Tel: 091-414 4611*

**NOT so long ago the market seemed to be swamped with sports games of every description. But all of them had one thing in common – joystick or keyboard bashing to the point of destruction.**

My first thought when I saw the cassette inlay for Winter Olympiad 88 was "Not again . . .", but the sheer addictiveness of this game soon changed my mind.

The scene is set as soon as you open the box, with a four page introduction to the forthcoming Canadian winter olympics by TV presenter David Vine. It conjures up pictures of crisp, snow-covered and mist-shrouded mountains dotted with pine trees that rustle in the wind.

However, as the manual itself is only six pages long, all instructions, hints and tips for the six different events are squashed on to the last two pages in small, eye-straining print.

That aside, the first part of the game to load is the core, so called because it is the section of program which controls each event.

This takes rather a long time, but eventually a rotating scoreboard appears, which stops turning and asks for the number of participants and their names. A nice touch this, and the revolving scoreboard crops up again later after each event.

The first event – Bob Sled – is quite hard. Using only the Z and X keys to apply left and right braking, you guide the bob-sled around each bend and curve of the icy channel, trying to squeeze as much speed as possible from the fragile-looking craft.

Banking too hard causes a heart-rending squeal of metal on ice, followed by the sled overturning, with the occupants falling out and ending up trapped underneath. It looks and sounds quite painful.

The scenery is animated quite well for an Electron game, with pine trees rushing – or creeping as some irreverent souls muttered – past to either side of your speeding toboggan.

Speed Skating is the next event and visually this is perhaps the best of all six. You are presented with two views of your player, one from the side and one from in front. These are synchronised quite well, with both heads bobbing together, and both sets of arms and legs swinging in unison.

I have to admit that pretty though it is, I'm not sure what purpose is served by splitting the display in this fashion. Nevertheless it looks good, even when the front view player banks sideways and his legs stop, while the side view player keeps his legs pumping steadfastly away!

Your controls for this event are the same as before, but this time an element of familiarity creeps in – you have to pump the keys alternately to gain speed and momentum.

There is an element of skill to this, however. Pressing the keys too quickly causes the skates to slip and you lose speed: Slow down and the speed needle starts to climb again.

The only niggle with this event – and with some of the later ones – is your inability to abandon the game if you are fed up and want to move on to the next one.

Each event has three heats, and if there are four players participating with each heat lasting 1-2 minutes, it can take 15 minutes to move on to the next event.

Moving on to the Ski Jump, event three, you are greeted with a spectacular view of your player poised at the top of the jump. After the three beeps you are again pumping the Z and X keys for all you are worth.

This time, finger speed is vital if you are to gain enough momentum for a good jump.

As the man reaches the end of the slide, the scene switches to a side-on view of your player being catapulted into the air. Now the Z and X keys become alignment controls for the skis.

The skis tend to drift apart in flight, so you must keep them in line until landing. Otherwise not only could you lose points for bad style, but also you might end up unceremoniously sliding face-down in the snow.

I quickly tired of this event, as after a while the game turns into a monotonous frantic key bash, followed by a quick bit of ski-alignment. There isn't really enough skill in this one.

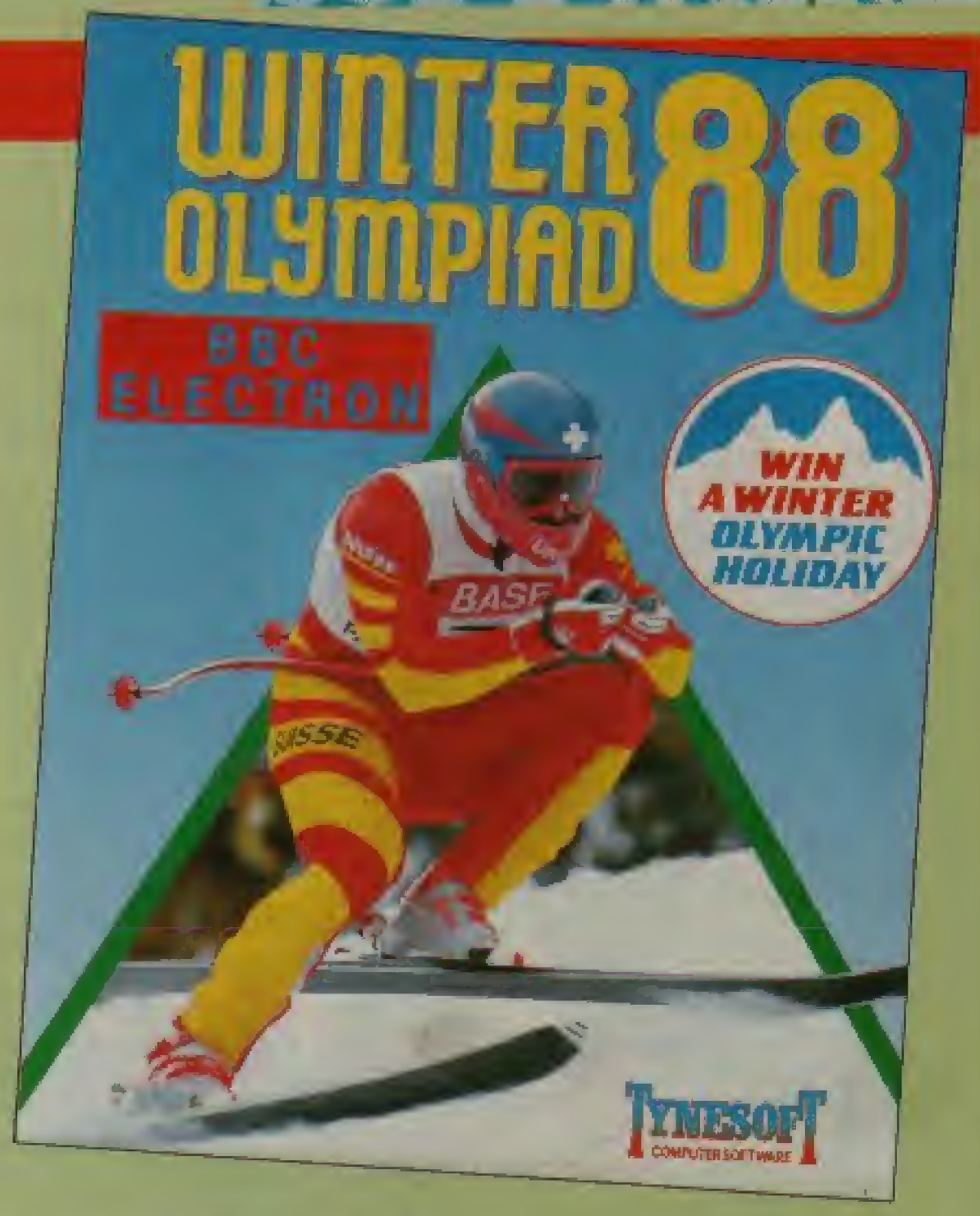
Event number four is the Giant Slalom, in which you rush downhill, guiding your skis between gates made of black and red poles.

This event was a lot more satisfying than the previous one, requiring lightning-fast reflexes to swing your player left and right through the gates.

These must be entered with the red pole to the player's left – your right – and in a panic this can easily be forgotten, resulting in doleful bongs from the computer's speaker as you accu-

*The biathlon*

*The downhill*




mulate penalties. At the end of each heat, any penalties add seconds to your score, and I can tell you that as a consequence mine was consistently worse than the other contestants.

The graphics for this event are very good indeed, accompanied by exhilarating whooshing noises as your skis cut swathes of snow at each turn.

The pole detection seemed very accurate, allowing some very tight squeezes to be accepted. But as soon as a pole is touched, it bends at an angle and you hear a warning tone – a highly addictive section of the game.

The Ski Slalom, event five, is next on the tape. This was quite good fun, and my favourite of the six events. Your viewpoint is from just behind and above your player's head as he plunges through the snow.

Gates appear to the left and right of you, leaving barely enough time to react and slam to one side or the other to clear the poles.

You really do need a lot of skill for this one, as the poles leave little margin for error. Sometimes the gates are so far to one side of you they can't be seen and a large blue arrow suddenly appears, suspended in mid air, which points to either left or right.

It's quite a feeling when you actually manage to respond to one of these warnings in time and shoot straight between the poles at an incredibly tight angle.

Again, good graphics. A mountain range scrolls from side to side in the distance as you manoeuvre. The warning arrows are a nice touch, but I challenge anyone to respond to all of them in time.

Moving on to event six you join the Biathlon. This is the final event on the tape, and as such it is quite a good finale for a very entertaining package. It is really two events in one. You first have to speed-ski up to a row of five targets using the Z and X keys, whereupon the screen expands to show the targets as a rifle-range with five bulls-eyes to hit.

Your rifle is then cocked – another nice touch achieved by clicking the cassette relay on and then off – and a black cross-hair moves down the target.

Pressing the spacebar fires your gun, and if the cross-hair is exactly over the bull at the time, you are rewarded with a satisfying smacking sound and the bull is coloured black. If you miss, you hear an off-key ding, and your miss is marked with a red cross.

This excercise is repeated for all five paper targets before you must again shoulder your rifle and speed off into the snow to find the next cluster of targets.

Overall, Winter Olympiad 88 is an entertaining package, marred only by the slight monotony of some events, and the inability to fast-forward to the section of your choice.

The sound effects are by nature limited, but there is a nice jingle at the end of each event which you may recognise from previous televised Winter Olympics.

As an Electron game, it holds up against even the BBC Micro – I ran the programs on both machines, with no noticeable change in speed.

At £9.95 Winter Olympiad 88 has got to be good value, as you are effectively getting six games for your money, and there is going to be something for everyone in each.

**Chris Nixon**

*Speed skating*

GOLDEN electron GAME

| | |
|---|---|
| *Sound* | *9* |
| *Graphics* | *10* |
| *Playability* | *10* |
| *Value for money* | *10* |
| *Overall* | *10* |

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# electron user ARCADE CORNER

Compiled by MARTIN REED

MOST *Electron User* readers will know of the Slogger Master Ram board. Many, including Pendragon and I, are proud owners.

For a few months now, Pendragon has been bringing news of the many formerly BBC Micro-only adventures that now run on the Electron with the Master Ram Board, not to mention the new adventures that are being released specifically for the 64k Electron.

As yet, however, I don't know of any arcade games specifically designed for the expanded machine. Think of the amazing possibilities of a full 32k game with Mode 1 or 2 graphics. Such games would rival anything available for the BBC Micro or any other machine. What about two versions – one 32k and one 64k – on the same tape?

This month's pokes come from Justin Tyas from Woodham Ferrers, Essex, Mark Richardson from Barking, Essex, Jason Hassam from Stepney, London, Paul Shackels from Southgate, London, and Troy Helm from Carmarthen, Dyfed.

Share your hints, tips, peeks and pokes with fellow *Electron User* arcade addicts – but please ensure they are all your own work. Send them to:

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### *Gisburne's Castle* – *Martech/Mastertronic*

Alistair Fisher has written in from Thorpe Bay, Essex, with a plea for help with Martech's arcade adventure, Gisburne's Castle. He cannot open the trapdoor or the rusty door or get into the dungeons.

Alistair says he has had the game for nearly two years and is getting desperate. I have hardly played the game myself – perhaps some of our talented readers may be able to help? With the recent re-release of the game on Mastertronic's Ricochet label, I think we may be seeing more of Gisburne's Castle.

### *Omega Orb* – *Audigenic*

Omega Orb features a cheat mode: Logon to a computer and type GROVEL. This gives you an extra life and can be used any time.

### *Soccer Boss* – *Alternative Software*

If football management is not your strong point, here's a cheat for Alternative Software's Soccer Boss. After the game has loaded, press Break, then type:

```
OLD
LIST 32
```

The value of your initial financial resources is held in CA%, and your starting division in DIV%. Change these values to obtain more cash or to start in a higher division.

### *Snapper* – *Acornsoft*

Here's an unusual tip – a cheat for the rom version of Acornsoft's Snapper! Insert the cartridge and switch the machine on. Wait for about a second and press Escape. You should then be able to list the game's Basic loader. Delete line 40 and enter the following line:

```
40 !&84=&90(0)
```

Then type RUN to load the rest of the program.

You will find you are only pursued by the red monster, and that you will be credited with the points of the current bonus fruit every time you pass your starting position, regardless of whether the fruit is actually displayed at the time.

Also, if you eat a power pill and catch the red monster – sending it back to its den – it will not come back out until you begin a new sheet. This allows you to complete the current sheet at your leisure.

### *Tarzan Boy* – *Alligata*

Here's a simple tip for anyone who finds Tarzan Boy a bit slow – just press Break. This switches the sound off and causes the game to speed up. However, this only works once: if you press Break a second time the Tarzan Boy sprite will be corrupted, turning into a series of vertical lines. Be careful.

### *Starship Command* – *Acornsoft*

This short routine for Acornsoft's Starship Command doubles the rate at which your starship's shields are replenished.

```
10 P%=&5700
20 [OPT 2:PHP:PHA
30 LDA#rate:STA &3485
40 PLA:PLP:RTS:]
50 rate=24
60 ?&220=0:?&221=&57
70 *FX 14,4
```

Enter the listing and type RUN. Then chain Starship Command from the beginning as usual.

The value of *rate* can be anywhere between zero (shields replenished slowly) and 255 (very quickly). The default value is 12. Try setting *rate* to 255. You can now simply ram the enemy ships – an appropriate revenge.

### *Spy vs Spy* – *Tynesoft*

Nathan Edmunds has written in with a request for help with Spy vs Spy. He has collected all the objects, but does not know how to put them in the briefcase.

He also wants to know which of them are actually needed to finish the game.

To put an object into the briefcase, you must put the briefcase into the cupboard, safe or filing cabinet and take the object.

Then put the object back where you found it and take the briefcase. The object is now in the case.

Objects in the briefcase show up as flashing symbols on the trapulator. You only need four items – passport, key, plans and money – to leave the embassy and win the game.

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# Character building

## The first instalment of a new series by ROBIN NIXON on how to create your own character sets

**OVER the next few months we'll be looking at ways of redefining the Electron's character set, seeing how to create new fonts for Epson-compatible printers and how to get a 40 character screen width in Modes 2 and 5, or even 80 characters in Mode 1.**

This month we'll kick off with Program I, a font designer. It enables you to quickly and simply define and use complete character sets without having to type a single VDU 23 statement.

As you may know, to obtain more than 32 user-defined characters it is usually necessary to "explode" the character set by issuing a *FX20 command.

This can be a bit fiddly and results in the loss of 256 bytes per set of characters. As we need 96 characters to create a complete set, that makes a total 768 bytes of memory required.

There is, however, another way. On a disc-based system we can just about squeeze our character definitions in pages &9, &A and &C of memory.

Tape users will need to use page &B, the function key buffer, in place of &A as this is the cassette input buffer which will be used for loading in the character sets.

So long as we don't try to BPUT or BGET using the cassette filing system, or define more than four evelopes there will be no problems.

Now that we've found somewhere to put our character sets, we need to tell the computer where to find them. This is achieved by altering the locations in page &3 as shown in the panel on the next page.

However, we need only be interested in the following three fonts: 32-63, numbers and punctuation, 64-95, upper case letters and 96-127, lower case letters.

Numbers and punctuation can go in page &9, uppercase letters in page &A (&B for tape users) and lowercase letters in page &C. So to set up the extra user-defined characters we have to change four bytes like this:

```
?&367=&78 (bits 4 5 and 6)
?&368=&9
?&369=&A  (&B for tape)
?&36A=&C
```

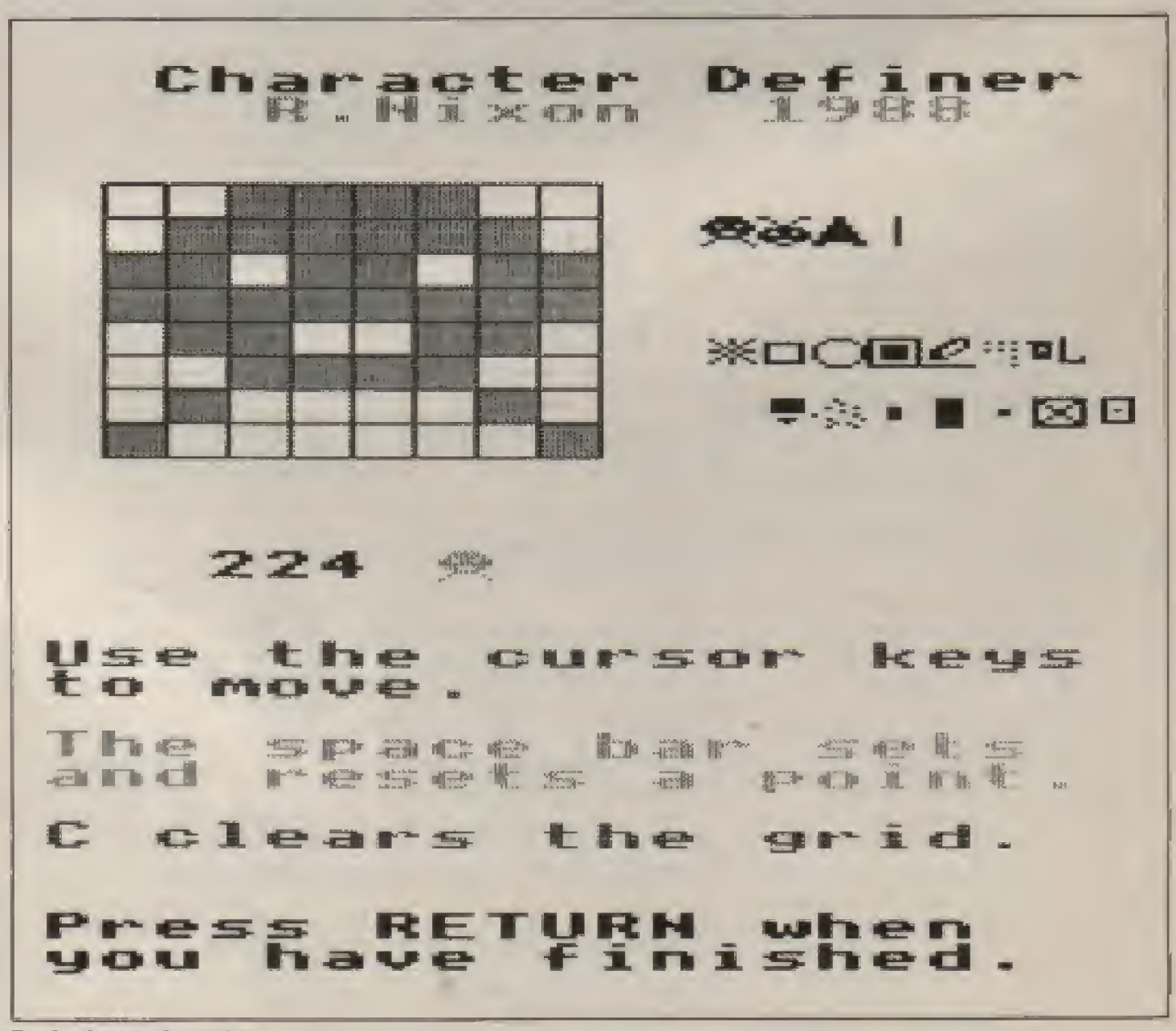
The three bits set in location &367 tell the computer to take the selected fonts from the specified pages in ram rather than the rom look up table. Ok so far, but we still have one problem – no user-defined characters.

Well, this bit's up to you. Using Program I define your three parts of the font and save each with a different filename, such as FONT-N, FONT-U and FONT-L, where N is numerical, U is upper case and L is lower case.

Then type in Program II, changing the filenames in lines 80-100 to those of your new font. If you are using a tape system, don't forget to change the A00 in line 90 to B00 and the ?&369=&A in line 130 to ?&369=&B. You can now merge your programs on to the end with your new font replacing the Electron's standard one.

The character definer can also be used to create your own user-definable characters which need only be loaded in at &C00 saving

*Turn to Page 22 ►*




*Designing a character*

# Programming

◀ From Page 21

you typing VDU 23 statements and making your programs shorter.

● *Next month we'll have a look at printing out the new fonts on a Epson-compatible printer. In the meantime I'd be interested to receive any fonts you design: If there's room, I'll include a printout of the best one in a future article.*

| | |
|---|---|
| **&900-&9FF** | Extra envelope storage area, envelopes 5-16.<br>Speech buffer.<br>RS423 output buffer.<br>Cassette output buffer. |
| **&A00-&AFF** | Cassette input buffer.<br>RS423 input buffer. |
| **&C00-&CFF** | User-defined characters 224-255. |

| | |
|---|---|
| **&367** | The font flag: This byte marks whether a particular set of 32 characters (font) is taken from rom or ram. If a bit is set the corresponding font is located in ram.<br>bit 6 characters 32-63<br>bit 5 characters 64-95<br>bit 4 characters 96-127<br>bit 3 characters 128-159<br>bit 2 characters 160-191<br>bit 1 characters 192-223<br>bit 0 characters 224-255 |
| **&368-&36E** | The font location bytes. These contain the high bytes for the location of each font. A font can only start at the beginning of a page so the low bytes are always 0. |

*The main areas of memory used*

*Program I*

```
  10 REM Character set
  20 REM definer
  30 REM
  40 REM By Robin Nixon
  50 REM (c) Electron User
  60 REM
  70 DIM CH% 8,A%(8,8),O$%
100:CC$=""
  80 MODE 5:VDU23;8202;0;0
;0;:RR%=12:SS%=5
  90 VDU 19,1,4,0,0,0
 100 VDU 19,2,1,0,0,0
 110 ON ERROR GOTO 570
 120 *FX 4,1
 130 *FX 11,8
 140 *FX 12,8
 150 *FX 20
 160 PROCgrid
 170 *FX 20
 180 PROCshowall
 190 VDU 31,0,18:COLOUR 3:
PRINT "To save or load a"
file, press ESCAPE.";SPC 9
:COLOUR 2:PRINT "To edit a
character""Select it using
 the""cursor keys. Then""
press RETURN.";STRING$(80,"
"):COLOUR 1
 200 PRINT "Which characte
r?";
 210 PROCselect
 220 PC%=RR%-12+((SS%-5)/2
)*8+224
 230 PROCgetinfo(PC%)
 240 CLS:PROCgrid:PROCshow
all:PROCshowcharacter(0)
 250 X%=1:Y%=1:VDU 31,3,16
:PRINT;PC%;
 260 VDU 31,0,19:COLOUR 2:
PRINT "Use the cursor keys"
"to move.":COLOUR 1:PRINT
"The space bar sets""and r
esets a point.":COLOUR 2:P
RINT "C clears the grid."
 270 COLOUR 7:PRINT "Press
 RETURN when""you have fin
ished."
 280 REPEAT PROCcursor:*FX
15
 290 REPEAT G%=GET:UNTIL G
%=13 OR G%=32 OR G%>135 OR
G%<128 OR G%=67:PROCcursor
 300 IF G%=136 X%=X%-1:IF
X%=0 X%=8
 310 IF G%=137 X%=X%+1:IFX
%=9 X%=1
 320 IF G%=138 Y%=Y%+1:IFY
%=9 Y%=1
 330 IF G%=139 Y%=Y%-1:IFY
%=0 Y%=8
 340 IF G%=32 A%(Y%,X%)=A%
(Y%,X%) EOR 1:PROCset(Y%,X%
)
 350 IF G%=67 VDU 23,PC%,0
,0,0,0,0,0,0,0:X1%=X%:Y1%=Y
%:PROCgetinfo(PC%):X%=X1%:Y
%=Y1%:PROCshowcharacter(1):
PROCshowall
 360 UNTIL G%=13
 370 VDU 23,PC%:FOR P%=1 T
O 8:GQ%=0:FOR Q%=1 TO 8:GQ%
=GQ%+A%(P%,Q%)*2^(8-Q%):NEX
T:VDU GQ%:NEXT
 380 GOTO160
 390 DEFPROCgetinfo(PC%):X
%=CH% MOD &100:Y%=CH% DIV &
100:A%=10:?CH%=PC%:CALL &FF
F1:ENDPROC
 400 DEFPROCgrid:VDU 31,2,
0:COLOUR 3:PRINT "Character
 Definer":COLOUR 1:VDU 31,4
,1:PRINT "R.Nixon  1988":GC
OL 0,2
 410 FOR J%=1 TO 9
 420 MOVE J%*72,896:DRAW J
%*72,688
 430 MOVE 72,(J%+16)*36-4:
DRAW 648,(J%+16)*36-4
 440 NEXT
 450 ENDPROC
 460 DEFPROCcursor:GCOL 3,
1:MOVE X%*72,(10-Y%+16)*36-
4:DRAW (X%+1)*72,(10-Y%+16)
*36-4:DRAW (X%+1)*72,(9-Y%+
16)*36-4:DRAW X%*72,(9-Y%+1
6)*36-4:DRAW X%*72,(10-Y%+1
6)*36-4:ENDPROC
 470 DEFPROCshowcharacter(
flag)
 480 FOR J%=1 TO 8
 490 FOR K%=1 TO 8
 500 A%(J%,K%)=0:IF (CH%?J
%) AND (2^(8-K%)) A%(J%,K%)
=1:PROCset(J%,K%) ELSE IF f
lag PROCset(J%,K%)
 510 NEXT
 520 NEXT
 530 ENDPROC
 540 DEFPROCshowall:VDU 28
,12,13,19,5:CLS:COLOUR 3:FO
R J%=224 TO 255:VDU J%:IF J
% MOD 8=7 PRINT
 550 NEXT:VDU 26,31,12,14:
COLOUR 7:COLOUR 129:PRINT C
C$:COLOUR 128:ENDPROC
 560 DEFPROCset(P%,Q%):GCO
L 0,A%(P%,Q%):PLOT 4,8%*72+
8,(10-P%+10)*36-8:PLOT 4,(Q
%+1)*72-8,(10-P%+16)*36-8:P
LOT 85,Q%*72+8,(10-(P%+1)+1
6)*36:PLOT 85,(8%+1)*72-8,(
10-(P%+1)+16)*36:PLOT 69,46
0+Q%*8,476+(9-P%)*4:ENDPROC
 570 *FX4
 580 *FX 11,20
 590 *FX 12,2
 600 ON ERROR CLS:REPORT:P
RINT " at line ";ERL:END
 610 MODE 6:PRINT "Do you
want to save this character
 set";:PROCyn:IF G$="N" OR
G$="n" GOTO640
 620 PRINT '':*.
 630 INPUT '"Enter file n
ame ? "$O$%:CC$=$O$%:$O$%="
*SAVE "+$O$%+" C00 D00":X%=
O$% MOD &100:Y%=O$% DIV &10
0:CALL &FFF7:GOTO 80
 640 PRINT '"Do you want
to load a character set";:P
ROCyn:IF G$="N" OR G$="n"PR
INT '':END
 650 PRINT '':*.
 660 INPUT '"Enter file n
ame ? "$O$%:CC$=$O$%:$O$%="
*LOAD "+$O$%:X%=O$% MOD &10
0:Y%=O$% DIV &100:CALL &FFF
7:GOTO 80
 670 DEFPROCyn:REPEAT G$=G
ET$:UNTIL G$="Y" OR G$="y"
OR G$="N" OR G$="n":ENDPROC
 680 DEFPROCselect
 690 COLOUR 4:COLOUR 129:V
DU 31,RR%,SS%,RR%-12+((SS%-
5)/2)*8+224
 700 REPEAT GG%=GET:COLOUR
 3:COLOUR 128:VDU 31,RR%,SS
%,RR%-12+((SS%-5)/2)*8+224
 710 IF GG%=136 RR%=RR%-1:
IF RR%=11 RR%=19:SS%=SS%-2:
IF SS%=3 SS%=11
 720 IF GG%=137 RR%=RR%+1:
IF RR%=20 RR%=12:SS%=SS%+2:
IF SS%=13 SS%=5
 730 IF GG%=138 SS%=SS%+2:
IF SS%=13 SS%=5
 740 IF GG%=139 SS%=SS%-2:
IF SS%=3 SS%=11
 750 COLOUR 4:COLOUR 129:V
DU 31,RR%,SS%,RR%-12+((SS%-
5)/2)*8+224
 760 UNTIL GG%=13:COLOUR 1
28:ENDPROC
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

*Program II*

```
  10 REM Character set
  20 REM loader
  30 REM
  40 REM By Robin Nixon
  50 REM (c) Electron User
  60 REM
  70 MODE 6
  80 *LO. COMP-N 900
  90 *LD. COMP-U A00
 100 *LO. COMP-L C00
 110 ?&367=&7B
 120 ?&368=&09
 130 ?&369=&0A
 140 ?&36A=&0C
```

***This listing is included in this month's cassette tape offer. See order form on Page 53.***

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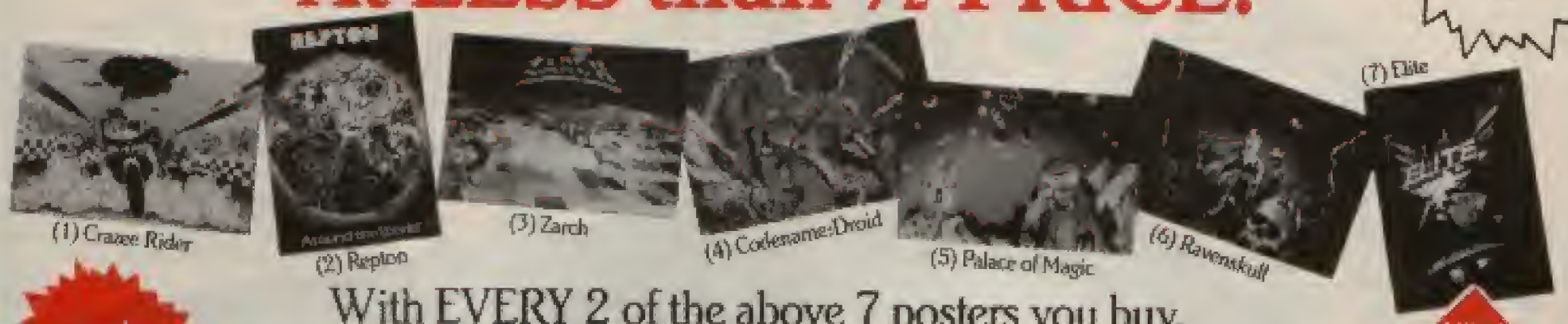


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If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

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**Word Processor:** Ideal for writing letters and reports. There is a constant display of both time and word count, plus a words-per-minute display to encourage the budding typist! A unique feature is the double-size text option in both edit and printer mode – perfect for young children and people with poor vision.

**Database:** You use this for storing information, just like an office filing cabinet. Facts you have entered can be quickly retrieved by just keying in a word or part of a word. They can be sorted, replaced, saved for future use or printed out.

**Spreadsheet:** Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet. Your results can be saved, to be used for future updates, or can be fed into its associated program . .

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☆ Database ☆ Graphics

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*Four full-scale programs for an incredible low, low price!* **£5.95** cassette

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# RAINBOW

## ROBIN NIXON introduces a colourful computer-aided design utility

**RAINBOW is a powerful graphics program suitable for many drawing applications. It features advanced drag and rounding facilities to help take the rough edges off your designs.**

The program works in Mode 5, thus giving four ink colours. It can draw lines, rectangles, circles and fill enclosed areas. It also provides several brush sizes and shapes and uses five drawing speeds.

After completing your work of art you can save your picture to disc or tape and later reload it.

In fact the only main feature it doesn't have is a screen dump to output the picture to the printer. This is because there are so many different printers and dumps that it was felt logical to leave dumping a saved screen up to you.

Rainbow has been made as easy to operate as possible. You only have to use the cursor keys and spacebar.

All functions are represented at the top and bottom of the screen as icons which can be accessed by moving the cursor to them and pressing the spacebar.

You can see these icons along with an explanation of their functions in Figure I.

At start-up certain icons have been pre-selected: The ink is set to red, the drawing speed is one and the pen has been selected.

On the screen you will see a flashing square box. This is the nib of the pen, brush or other icon you are using.

If you press the spacebar the computer beeps and the ink is turned on. If you then move the cursor, the pen draws on the screen. If you press the spacebar again the computer beeps and the ink is turned off. Once you've typed in the program, try practising with the options.

There are 10 icons at the top of the screen. The first four control the colour of the ink and the next five control the nib's speed.

Speed five is quite slow and so is ideal for intricate design work, as any slips of the nib will result in minimal errors. On the other hand speed one is very fast and is useful for drawing large objects.

The tenth icon is erase. To avoid accessing this function accidentally you must select it twice. When you've finished practising with the top set of icons try out erase.

Now for the bottom 10 icons. First is the pen – the one you have been using until now, unless you've selected another option.

The next icon is scatter. This works in the same way as the pen, but draws a pattern of scattered dots.

The next two icons are the small and large brushes. They work in a similar way to the pen except that the ink comes out in one of two larger sizes.

Icon five at the bottom is line draw. If you take a look at Figure II you'll see that line draw enables you to drag a line around until it is exactly where you want it before placing it on the screen.

When you press the spacebar the computer beeps at a different pitch to tell you it has remembered the position of the nib.

As you move the pen about, a line is dragged until you press the spacebar again, whereupon the line is placed on the screen.

The next icon, rectangle draw, is similar to line draw except that you can drag rectangles around the screen. Figure III shows how this works

Looking at Figure IV you will see that the seventh

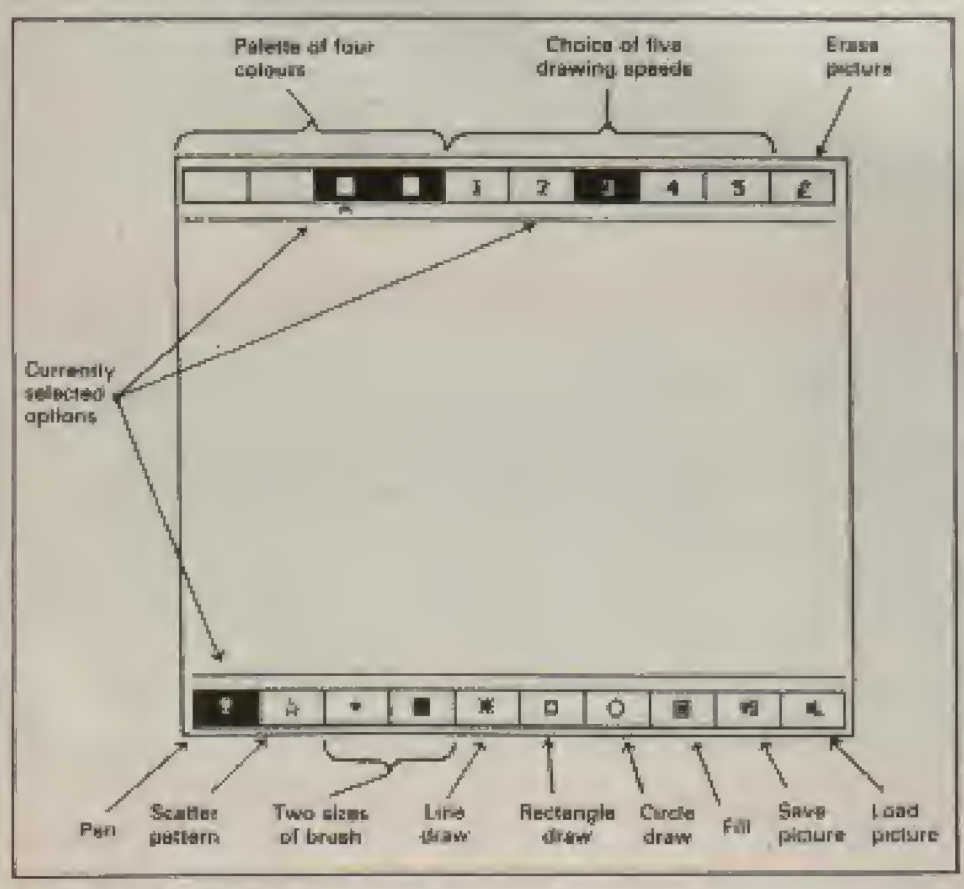


*Figure I: The screen icons*

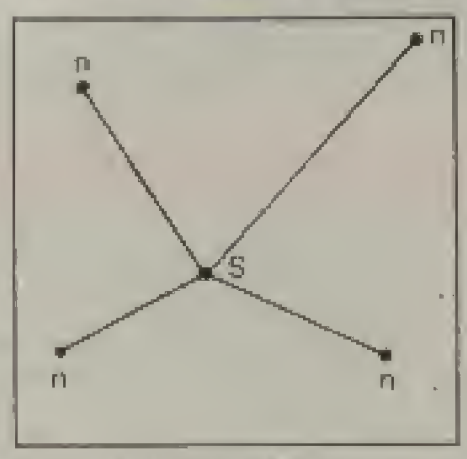


*Figure II: Using rubber-banding to drag lines from start position (S) to Nib position (n)*

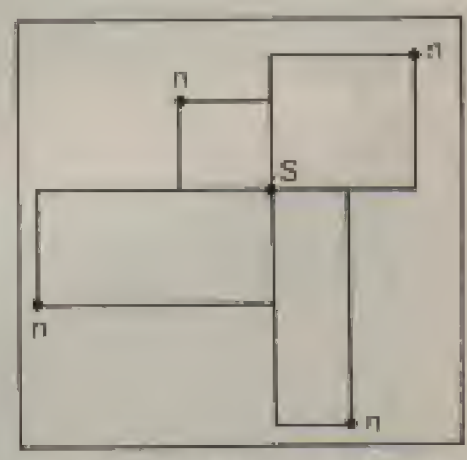


*Figure III: Dragging rectangles from start (S) to Nib position (n)*

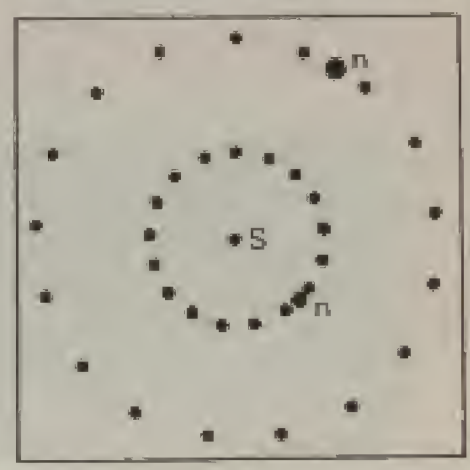


*Figure IV: Dragging a circle's circumference from start position (S) to Nib position (n). Until the circle is drawn on the screen it is represented by a number of dots.*

# More great Electron games

This month we introduce a new volume in our Ten of the Best series – 10 more games to give you many hours of fun and entertainment.

These four packages are crammed with the best games from the last two years of Electron User. As an added bonus a previously unpublished game has been added to each one – stunning machine code masterpieces from our technical wizard, Roland Waddilove.

So give yourself a treat. . . with the most popular games compilations we've ever produced.

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**£5.95** tape
**£6.95** 3½" disc

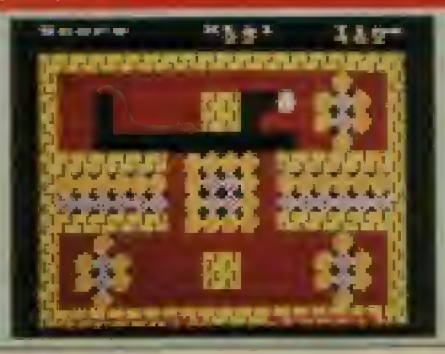
## Volume 1

**Jam Butty:** *Machine code simulation of high drama on a building site.*
**Golf:** *Play a round by yourself, or play against your pals*
**Haunted House:** *Fight against all the odds to get out alive.*
**Space Hike:** *Another classic, Help the spaceman avoid marauding monsters.*
**Parky's Peril:** *Help Parky through an invisible maze, racing against time.*
**Rally Driver:** *All the thrills of high -speed driving with none of the risks.*
**Alphaswap:** *Your letters are in a twist. Can you put them in order.*
**Knockout:** *Fast and furious action as you batter down a brick wall.*
**Money Maze:** *Avoid ghosts and collect coins in an all-action arcade classic.*
**Lunar Lander:** *The traditional computer game specially written for the Electron.*

## Volume 2

**Atom Smash:** *Machine code thrills as you help to save the world from destruction.*
**Bunny Blitz:** *Go egg collecting, but keep away from proliferating rabbits.*
**Castles of Sand:** *Build castles – but beware the rising tide and hungry sandworms.*
**Reaction Timer:** *Test your reactions with this traffic lights simulation.*
**Solitaire:** *The Electron version of the age-old game of logic and patience.*
**Jumper:** *Jump for your life in this exciting arcade action game.*
**Break free:** *Test your wits and reflexes in this popular classic ball game.*
**Code breaker:** *Crack the code in a colourful if frustrating brainteaser.*
**Parachute:** *Save the plunging sky divers from a watery end.*
**Star fighter:** *Attack the bandit ships in this fast-moving 3D punch up.*

## Volume 3



**Rockfall:** *Come diamond mining in this fun packed game with its own screen designer.*
**Karate Warrior:** *Win your black belt in this gruelling test of karate skill.*
**Grand Prix:** *Battle your way into the lead in this tricky racing simulation.*
**Invasion Force:** *Can you survive wave after wave of relentlessly advancing aliens.*
**Grebit:** *Guide the frog across the busy road then across the fast-flowing river!*
**Fruit Worm:** *Steer the worm towards the fruit while avoiding rocks and its ever-growing tail.*
**Manic Mole:** *Watch out for melting platforms and conveyor belts in your quest for jewels.*
**Skremble:** *Fly your fighter fast and low over the landscape to penetrate enemy territory.*
**Mr. Freeze:** *You'll need speed and strategy to reach the ice blocks before they melt away.*
**Paint Roller:** *Steer a speeding roller, run over paint pots but keep clear of the rocks.*

## Volume 4

NEW

**Lunar Invasion:** *Defend the moon from wave after wave of marauding aliens in this superb multi-screen arcade game.*
**Howzat:** *Try not to get caught out in this vivid recreation of a day's test cricket.*
**Snapdragon:** *Enjoy this two-player micro version of the familiar card game.*
**Day at the Races:** *Fancy a flutter? You can bet your shirt in safety in this two-player horse racing game.*
**Reversi:** *Combine cunning and chance as you try to out-think your Electron at this classic board game.*
**Fishing:** *Relax and enjoy a quiet afternoon by a shady brook. You'll regret if you let this one get away.*
**Cavern Capers:** *Escape from the depths of the planet by blasting oil drums and dodging deadly fireballs.*
**Craal:** *Escape from the maze and win the beautiful princess in this superb text adventure.*
**Oxo:** *High strategy meets low cunning in a logic game to strain your brain.*
**Missile Attack** *Defend your city from a missile invasion and save it from certain doom.*

TO ORDER PLEASE USE THE FORM ON PAGE 53

icon, circle, is slightly different from the previous ones.

Once you've pressed the spacebar to register the centre of a circle you will see a series of dots appear in a ring. These spread out as you move the cursor.

The circumference of the circle represented by the dots lies exactly on your new nib position. The dots are used because drawing circles in Basic takes a long time and you would not be able to achieve the real time dragging effect.

The fill icon is a partial fill routine. When you press the spacebar with the fill icon selected, the area underneath is filled in with the current ink.

As this is only a partial fill it may take three or four goes to fill an object entirely.

The last two icons are to save and load pictures. As their names suggest, these options either save or load the picture to or from disc or tape. The picture is saved under the filename PICTURE.

If you are using a tape recorder make sure you have wound the cassette to the correct place when saving or loading as none of the normal messages will be displayed.

```
  10 REM      RAINBOW
  20 REM
  30 REM  By  Robin Nixon
  40 REM (c) Electron User
  50 REM
  60 MODE5:VDU 23;8202;0;0
;0;
  70 PROCinitcircle:*OPT 1
,0
  80 PX%=640:QX%=512:*FX16
  90 VDU 28,0,1,39,0
 100 VDU 19,0,4,0,0,0
 110 VDU 19,1,0,0,0,0
 120 VDU 19,2,1,0,0,0
 130 VDU 19,3,2,0,0,0
 140 VDU 23,240,73,42,20,1
07,20,42,73,0
 150 VDU 23,241,0,126,66,6
6,66,66,126,0
 160 VDU 23,242,60,66,129,
129,129,129,66,60
 170 VDU 23,243,255,129,18
9,189,189,189,129,255
 180 VDU 23,244,14,26,50,1
00,104,112,0,255
 190 VDU 23,245,15,233,232
,175,225,233,15,0
 200 VDU 23,246,0,232,232,
168,232,233,15,0
 210 VDU 23,249,62,62,62,6
2,0,28,8,0
 220 VDU 23,250,16,8,34,8,
130,33,20,34
 230 VDU 23,251,0,0,24,24,
24,24,0,0
 240 VDU 23,252,60,60,60,6
0,60,60,60,60
 250 VDU 23,253,0,0,0,24,2
4,0,0,0
 260 VDU 23,254,255,195,16
5,153,153,165,195,255
 270 VDU 23,255,62,34,34,4
2,34,34,62,0
 280 VDU 24,0;96;1279;927;
:GCOL0,129:CLG:VDU 26
 290 GCOL0,3:MOVE 0,1023:D
RAW 1279,1023:DRAW 1279,963
:DRAW 0,963
 300 MOVE 0,0:DRAW 1279,0:
DRAW 1279,64:DRAW 0,64:MOVE
 0,92:DRAW 1279,92
 310 MOVE 0,931:DRAW 1279,
931
 320 FORX%=0TO1279STEP128:
MOVE X%,1023:DRAW X%,963:MO
VE X%,0:DRAW X%,64:NEXT
 330 VDU5:FORX%=0TO3:MOVEX
%+128+4,1019:PROCbox(0,X%):
GCOL0,1
 340 MOVE X%+128+32,1004:V
DU252:NEXT:GCOL0,2
 350 FORX%=1TO5:MOVEX%*128
+420,1000:VDUX%+48:NEXT:MOV
E 1184,1000:VDU244
 360 GCOL0,2:FORX%=1TO4:MO
VEX%*128-96,48:VDUX%+240:NE
XT
 370 FORX%=1TO4:MOVEX%*128
+416,48:VDUX%+239:NEXT:FORX
%=3TO2:MOVEX%*128+934,48:VD
UX%+244:NEXT:CR%=255
 380 X%=640:Y%=512:X1%=640
:Y1%=512:X2%=640:Y2%=512:GC
OL3,2:PLOT4,X%-32,Y%+12
 390 VDU255:GCOL0,3:Y1%=51
2:N%=2:F%=1:R%=4:C%=2:BR%=0
:BF%=0:EF%=0
 400 EF1%=0:SF%=0:SF1%=0:C
F%=0:CF1%=0:CF2%=0:BB%=0:FF
%=0:WF%=0:H%=40
 410 MOVE BB%*128+4,60:X3%
=0:Y3%=0:PROCbox(4,0)
 420 X5%=X%:MOVE (N%/2*3)*
128+4,1019:PROCbox(4,0):MOV
E C%*128+32,952:GCOL4,0:VDU
94:GCOL0,C%
 430 REPEAT:OSCLI(FX178,2
55):IF INKEY -122 PX%=PX%+H%
:IF PX%>1279 PX%=1279
 440 IF INKEY -26 PX%=PX%-H%
:IF PX%<0 PX%=0
 450 IF NOT INKEY -42 GOTO
 470 ELSE QX%=QX%-H%:IF QX%<50
 QX%=50
 460 IF QX%<992 AND Y%=992
 QX%=915:Y%=QX%
 470 IF NOT INKEY -58 GOTO
 490 ELSE QX%=QX%+H%:IF QX%>10
00 QX%=1000
 480 IF QX%>36 AND Y%=36 QX
%=112:Y%=QX%
 490 IF INKEY -99 PROCconof
f
 500 OSCLI("FX178"):A%=PX%
-X%:B%=QX%-Y%
 510 GCOL3,2:PLOT4,X1%-32,
Y1%+12:VDU CR%:GCOL0,C%:MOV
E X%,Y%:X%=X%+A%/N%:Y%=Y%+B
%/N%:IF Y%>915 Y%=992:X%=(P
%+128) DIV 128*128-64:R%=4
 520 IF Y%<112 Y%=36:X%=(P
%+128) DIV 128*128-64:R%=4
 530 IF Y%=992 OR Y%=36 CR
%=254 ELSE CR%=255
 540 IF EF%=1 AND Y2%<990
AND Y2%>64 AND R%=5 EF1%=1
 550 IF (Y2%<990 AND Y%>99
0) AND EI%=1 GCOL4,0:DRAW X
2%,Y2%:PLOT69,X2%,Y2%:GCOL0
,C%:EF1%=0
 560 IF (Y2%>64 AND Y%<64)
 AND EF%=1 GCOL4,0:DRAW X2%
,Y2%:PLOT69,X2%,Y2%:GCOL0,C
%:EF1%=0
 570 IF EF1%=1 GCOL4,0:DRA
WX2%,Y2%:DRAW X%,Y%:GCOL0,C
%:GOTO650
 580 IF SF%=1 AND Y2%<990
AND Y2%>64 AND R%=5 SF1%=1 E
LSE IF (Y2%<990 AND Y%>990)
 OR (Y2%>64 AND Y%<64) AND
SF%=1 SF1%=0
 590 IF SF1%=1 GCOL4,0:MOV
E X%,Y%:DRAWX%,Y2%:DRAW X2%
,Y2%:DRAWX2%,Y%:DRAW X%,Y%:
DRAWX%,Y2%:DRAW X2%,Y2%:DRA
WX2%,Y%:DRAW X%,Y%:GCOL0,C%
:GOTO650
 600 IFBF%=1 AND R%=5 MOVE
 X%-32,Y%+12:VDUBR%:GOTO650
 610 IF CF%=1 AND Y2%<990
AND Y2%>64 AND R%=5 CF1%=1
ELSE IF (Y2%<990 AND Y%>990
) OR (Y2%>64 AND Y%<64) AND
 CF%=1 CF1%=0
 620 IF CF1%=1 GCOL4,0:L%=
SQR(4*ABS(X%-X2%)*ABS(X%-X2%)
+ABS(Y%-Y2%)*ABS(Y%-Y2%));F
OR J%=0 TO 1:FOR K%=0 TO 30
STEP 4:PLOT 69,X2%+L%*A%(K
%,0)/100,Y2%+L%*A%(K%,1)/10
0:NEXT K%,J%:GCOL0,C%:GOTO6
50
 630 IF FF%=1 AND Y%>64 AN
D Y%<990 AND R%=5 PROCfill:
GOTO650
 640 PLOTR%,X%,Y%:Y2%=Y%:X
2%=X%
 650 GCOL3,2:PLOT4,X%-32,Y
%+12:VDUCR%:GCOL0,C%:X1%=X%
:Y1%=Y%
 660 UNTIL 0
```

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◀ From Page 27

```
  670 DEFPROConoff:REPEAT U
NTIL NOT INKEY -99
  680 S%=(X%-64)/128:IFY%<>
992 GOTO750
  690 IFWF%>0 AND S%<>9 MOV
E 1156,1019:PROCbox(4,0):WF
%=0
  700 IF S%<4 MOVE C%*128+3
2,952:GCOL4,0:VDU94:C%=S%:M
OVE C%*128+32,952:VDU94:GCO
L0,C%:GOTO960
  710 IF S%=9 WF%=WF%+1:MOV
E 1156,1019:PROCbox(4,0):SO
UND1,-15,120,1:IF WF%=2 WF%
=0:VDU24,0;96;1279;927;:GCO
L0,129:CLS:VDU26
  720 IF S%=9 GOTO960
  730 MOVE (N%/2+3)*128+4,1
019:PROCbox(4,0):N%=(S%-3)*
2:MOVE (N%/2+3)*128+4,1019:
PROCbox(4,0):H%=(5-(S%-4))*
8:GOTO 960
  740 GOTO960
  750 IFWF%>0 MOVE 1156,101
9:PROCbox(4,0):WF%=0
  760 IFY%<>36 GOTO910
  770 IF S%<8 MOVE BB%*128+
4,60:PROCbox(4,0) ELSE SOUN
D1,-15,120,1
  780 IF S%<8 EF%=0:SF%=0:C
F%=0:BF%=0:FF%=0
  790  ON S%+1 GOTO 800,810
,810,810,820,830,840,850,86
0,880
  800 BF%=0:GOTO900
  810 BB%=S%+249:BF%=1:GOTO
900
  820 EF%=1:X2%=X%:Y2%=Y%:G
OTO900
  830 SF%=1:X2%=X%:Y2%=Y%:G
OTO900
  840 CF%=1:X2%=X%:Y2%=Y%:G
OTO900
  850 FF%=1:GOTO900
  860 MOVE S%*128+4,60:PROC
box(4,0):*SAVE PICTURE 5BC0
 7C40
  870 MOVE S%*128+4,60:PROC
box(4,0):GOTO960
  880 MOVE S%*128+4,60:PROC
box(4,0):*LOAD PICTURE 5BC0
  890 MOVE S%*128+4,60:PROC
box(4,0):GOTO960
  900 BB%=S%:MOVE BB%*128+4
,60:PROCbox(4,0):GOTO960
  910 IF EF1%=1 GCOL3,2:PLO
T4,X1%-32,Y1%+12:VDUCR%:GCO
L0,C%:MOVE X2%,Y2%:DRAW X%,
Y%:GCOL3,2:PLOT4,X%-32,Y%+1
2:VDUCR%:GCOL0,C%:X2%=X%:Y2
%=Y%:GOTO960 ELSE IF EF%=1
AX%=5:GOTO960
  920 IF SF1%=1 GCOL3,2:PLO
T4,X1%-32,Y1%+12:VDUCR%:GCO
L0,C%:MOVE X%,Y%:DRAW X%,Y2
%:DRAW X2%,Y2%:DRAW X2%,Y%:
DRAW X%,Y%:X2%=X%:Y2%=Y%:GC
OL3,2:PLOT4,X%-32,Y%+12:VDU
CR%:GCOL0,C%:R%=4:SF1%=0:GO
TO960 ELSE IF SF%=1 AX%=5:GO
TO960
  930 IF CF1%=1 SOUND1,-15,
```

This is one of hundreds of programs now available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs will also run on the Electron

```
50,1:GCOL3,2:PLOT4,X1%-32,Y
1%+12:VDUCR%:GCOL0,C%:VDU26
,0;96;1279;927;:MOVE X2%+L%
*A%(31,0)/100,Y2%+L%*A%(31,
1)/100:FOR J%=0 TO 31:DRAW
X2%+L%*A%(J%,0)/100,Y2%+L%*
A%(J%,1)/100:NEXT:CF2%=1
  940 IF CF2%=1 VDU26:X2%=X
%:Y2%=Y%:R%=4:CF1%=0:GCOL3,
2:PLOT4,X1%-32,Y1%+12:VDUCR
%:GCOL0,C%:CF2%=0:ENDPROC
  950 IF R%=5 R%=4:F%=1:GOT
O960 ELSE R%=5:F%=0
  960 SOUND1,-15,100+R%*450
,1:ENDPROC
  970 DEFPROCbox(BC%,CC%):P
LOT 0,8,0:GCOLBC%,CC%:PLOT0
,100,0:PLOT81,-100,-54:PLOT
0,0,0:PLOT0,100,0:PLOT81,0,
50:ENDPROC
  980 DEFPROCinitcircle:DIM
A%(32,1):X%=0:FOR A=PI TO P
I*3 STEP PI/16:A%(X%,0)=SIN
(A)*100:A%(X%,1)=COS(A)*100
:X%=X%+1:NEXT:ENDPROC
  990 DEFPROCfill:Y4%=Y%:BC
%=POINT(X%,Y%):IF BC%=C% EN
DPROC
 1000 GCOL0,BC%+128:PROCmid
dle(4):PROCmiddle(-4):MOVE
X%,Y%:R%=4:SOUND1,-15,120,1
:ENDPROC
 1010 DEFPROCmiddle(DD%):Y4
%=Y%:PLOT77,X%,Y%:Z1%=!&314
 MOD &10000*8:Z2%=!&310 MOD
 &10000
 1020 REPEATX4%=Z1%+(Z2%-Z1
%)/2:MOVE X4%,Y4%:PLOT77,X4
%,Y4%:Z1%=!&314 MOD &10000*
8:Z2%=!&310 MOD &10000:Y4%=
Y4%+DD%
 1030 UNTILPOINT(X4%,Y4%)<>
BC% OR Y4%>927 OR Y4%<96:EN
DPROC
```

***This listing is included in this month's cassette tape offer. See order form on Page 53.***


# JOYSTICKS— THE COMPLETE SOLUTION

**DELTA 3B SINGLE–BBC B or ELECTRON PLUS 1** **£12.95**
A single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

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A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

**DELTA 3S SINGLE–MASTER COMPACT or ELECTRON FIRST BYTE INTERFACE** **£12.95**
The same light, hand-held, fast, light action of a 3B but fitted with switches for use with a switched joystick interface, such as a First Byte.

**FIRST BYTE INTERFACE** **£19.95**
**PLUS 1 INTERFACE** **£49.95**
**SLOGGER JOYSTICK INTERFACE** **£19.95**
To run a Delta 3S switched joystick on a Plus 1 which runs many of the new Acorn compatible joystick programs.

**SPECIAL OFFERS**
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# Forecasting sunny days

## JOE PRITCHARD introduces the Electron User weather station

**WE have seen recently that even the professional weather forecasters with all their super computers can't always forecast the weather properly.**

In my household, the cat will accurately tell us what the weather's like. If he won't stir from his chair to go outside, the chances are it's cold, wet or both.

Seriously though, this month we start on some interfaces that will allow us to monitor certain aspects of the weather, so you'll be able to keep a record of weather conditions.

Future articles will detail software, and also a bit of general information about the weather. You'll also find that the circuits we consider will be of use in other applications as well, so even if you're not a budding meteorologist, read on.

The first circuit we'll build is for a thermometer – an instrument that not only allows us to measure the current temperature, but with suitable software will also give us a maximum and minimum. It will automatically record the highest and lowest temperatures recorded since the computer was turned on.

The temperature sensor circuit is based upon the differential amplifier we looked at last month. I used a silicon diode for the temperature sensor, and the circuit is shown in Figure I.

The preset resistor VR1, is a bit like the potentiometer we first met in part four of this series. It's a component whose electrical resistance we can vary, though for a preset resistor we use a screwdriver or something similar to adjust the resistance.

Presets are used where we need to adjust a circuit very infrequently. In this case, we use the preset to adjust the zero degrees C reading for each thermometer to be the same.

The amplifier used is the useful little CA3140. As we mentioned last month, unlike most operational amplifiers, the 3140 is quite happy to run off +5V, without a –5 volt supply. This means we can power the circuit directly from the Plus 1.

It doesn't take very much current, so we won't be in danger of overloading the Electron's power supply.

In this circuit the resistor values used are quite important as they set the gain, and hence the behaviour, of the circuit. Stick to the values given, and use five per cent tolerance components if at all possible.

Ok, let's start building. A piece of stripboard is used, and in addition to the parts on the circuit diagram you'll need a socket for the operational amplifier.

Apart from cutting out the risk of damage while soldering, it allows you to get the op amp out of the board and use it for other projects if you need to.

The socket required is called an 8-pin DIL socket and is available from most electronic component stockists. In addition, you'll need a 3.5mm jack plug and socket for the temperature probe. (Figure II.)

Eventually we'll be putting all the weather monitoring circuits into one box, so for the time being we'll leave them uncased.

The layout of the stripboard is shown in Figure III, where as usual, X marks the tracks which need to be cut.

Solder in the wire links first, followed by the DIL socket, then the resistors.

Now check everything, especially the track breaks and the soldering below the socket. It's surprisingly easy to put a blob of solder across two tracks.

Finally, build the temperature sensor. Take care to get the diode the right way around. If you're quite sure all is well, you can plug in the operational amplifier.

Turn off the Electron and connect the circuit to the Plus 1 analogue port.

The circuit is connected to a terminal block by wires which are pushed into the terminal block holes and then the screws tightened up. At this point, we can plug in the temperature sensor.

Turn on the Electron. If all is well the computer will behave normally. Put your finger on the operational amplifier chip. It shouldn't be hot. If it is, turn the micro off and check your wiring.

Now for the fun part. Using Program I, adjust the preset until a value of about 150 is displayed on the screen:

```
 5 REM Program I
10 REPEAT
20 PRINTTAB(10,10)    ;FN
adval;
30 UNTIL FALSE
40 :
50 DEFFNadval=(INT(ADVAL(1
))/256)
```

Now hold the diode end of the temperature probe between your fingers. The reading should gradually increase as the temperature of the probe rises.

Then let the diode cool down – or help it by putting it in the fridge or freezer.

*Turn to Page 30 ▶*

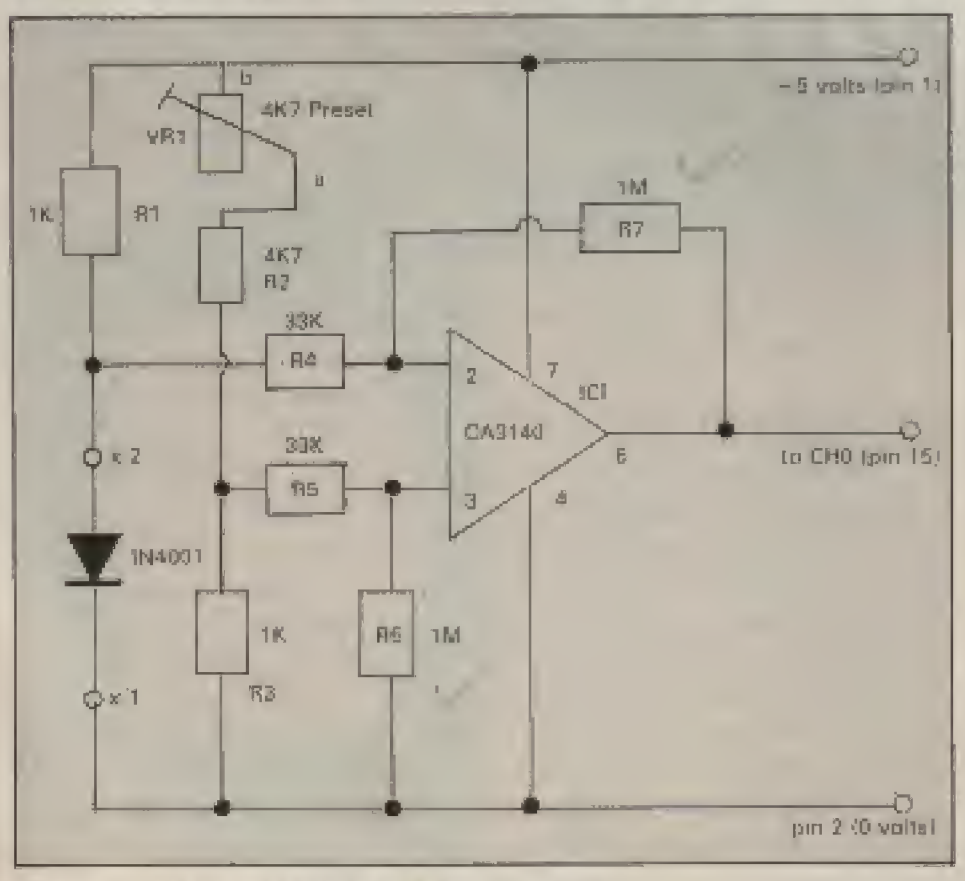


*Figure I: The temperature sensing circuit*

◄ From Page 29

You should see the reading fall.

If this occurs, congratulations, you have a working thermometer. If not, check the wiring.

The easiest mistake to make is the diode connection. Check it's the right way round. If it is, check that the operational amplifier is in the socket the right way around, and check all your connections again.

I decided that we should try and cover a temperature range from a little below zero degrees Celcius to around 40 degrees. This will cover most situations, assuming Britain doesn't suddenly go tropical or start an ice age.

The first point to mark is the zero point. Keep the program running and mix some ice cubes and cold water. Let them stand for a while, and while there is still solid ice in the water pop the temperature probe in (waterproof it first with tape!).

Give it a quick stir, then leave it for five minutes to allow the probe to get to the surrounding water temperature.

Adjust the preset to get a reading of about 10 and record this somewhere. Call this value *temp0*.

You can use either a small screwdriver to adjust the preset or a filed-down knitting needle or piece of plastic rod.

The advantages of using plastic or any other non-conductor to adjust this component are that no variation of the signal due to the electrical field picked up by your body is noted.

If you use a jeweller's screwdriver, the value returned by FNadval will flicker until you remove your hand.

This adjustment should be made carefully, as a small movement on the preset causes a relatively large change on the reading returned.

Now you'll need a normal thermometer and some warm water from the tap. Put the probe in the warm water – which should be around 35 degrees C – and again allow it to reach the water temperature.

Now record the reading taken on the thermometer, calling this value *temp*, and the reading displayed on the micro, call this *temp40*.

If the value displayed is above 255 either cool the water slightly or decrease the sensitivity of the thermometer.

Because the diode responds to temperature changes in a predictable fashion, we can now write a function to convert the reading returned by FNadval to a temperature.

What we need to do now is work out the relationship between the displayed value – between zero and 255 – and the temperature. So, first of all, calculate the following:

```
counts per degree = temp/(t
emp40-temp0)
```

Here we're simply using the difference between the readings obtained at zero and *temp* degrees C to calculate the number of ADC counts returned by FNadval for a single degree.

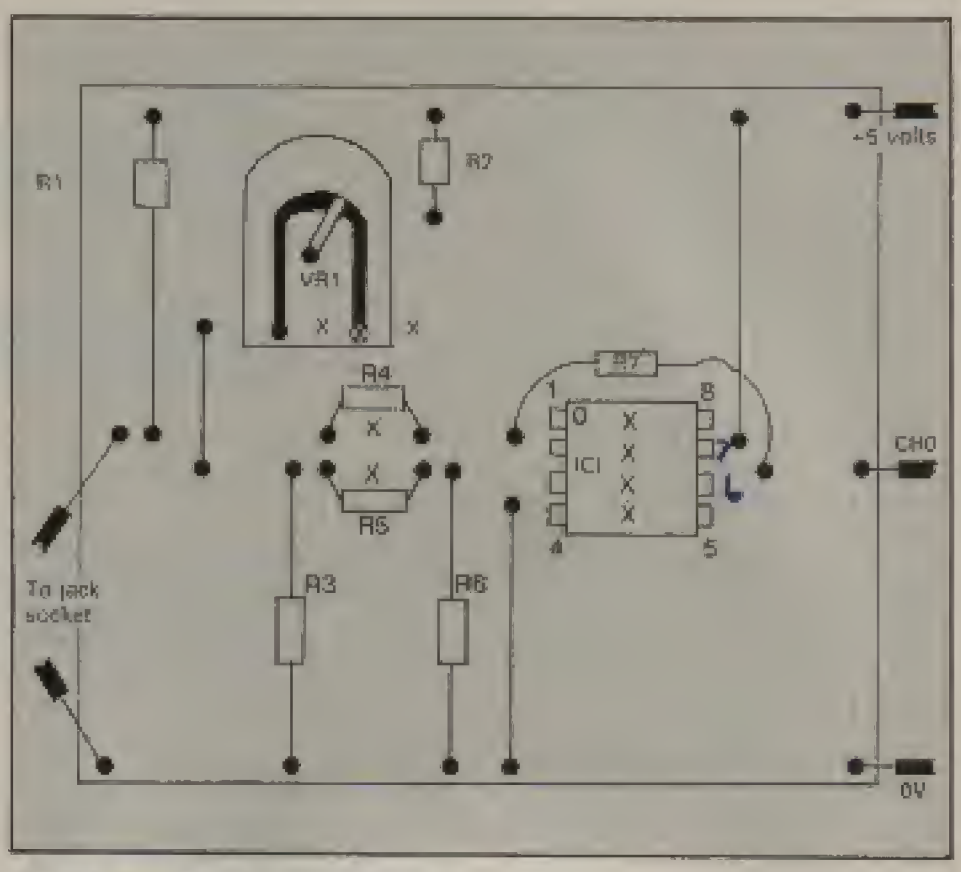


*Figure III: Layout of the circuit*

Now, we can use this to convert any reading from FNadval in the range zero to 255 into a temperature in degrees C. The formula is:

```
temperature = (reading-temp
0)/counts per degree
```

We need to subtract *temp0* from the FNadval reading returned because the circuit wasn't set to return a value of zero for zero degrees C.

As a worked example, one of my prototypes was set to record eight at zero. At 38 degrees a value of 252 was returned. Therefore:

```
counts per degree = (252-8)/38
                  = 6.4
```

Assume now, that we have a reading from FNadval of 200. What is the temperature? Well, we simply say:

```
temp = (200-8)/6.4
temp = 30
```

Program II is a short listing to return the correct temperature. You'll need to change the values of *counts-per-degree* and *temp0* to suit your own circuit.

If you need to vary the range of temperatures covered by this thermometer, then decrease the values of the 33k resistors connected to pins 2 and 3 of the CA3140.

```
   5REM PROGRAM II
  10 x%=820209
  20 REPEAT
  30 PRINTTAB(10,10)" ";f
Ntemperature;   ("
  40 UNTIL FALSE
  50 :
  60 DEFFNadval
  70 =INT(ADVAL(1)/256)
  80 DEFFNtemperature
  90 counts_per_degree=6.4
 100 temp0=17
 110 =(FNadval-temp0)/coun
ts_per_degree
```

This will decrease the gain of the amplifier and so increase the range of temperature covered, by virtue of the fact that a larger change in temperature will be needed to get a similar change in value returned by FNadval.

Calibration is just the same. If you want to experiment, try a value of 47k for each resistor. However, it's important to remember that both resistors must be the same value – if you change one, you must change the other as well.

● *In the next instalment of the* Electron User *weather station, I'll detail some software for the thermometer, and also outline suitable housings for the diode probe in the garden. We'll also look at ways of measuring humidity.*

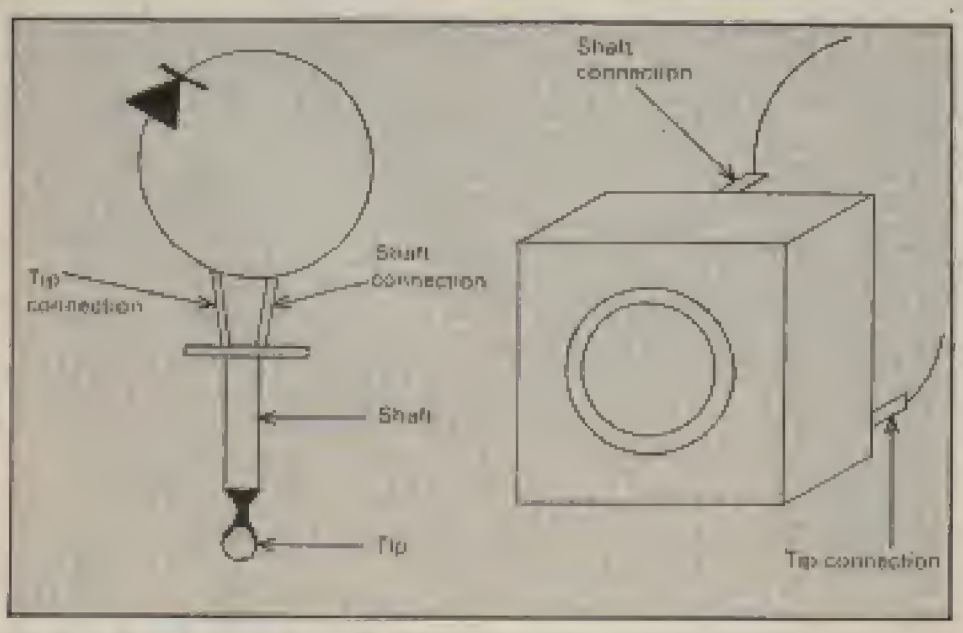


*Figure II: 3.5mm jack socket*

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# Let's bring your screen to life

## Create animated characters with ROLAND WADDILOVE's easy-to-use sprite designer

**LOOKING at the latest arcade games released by the software houses, you may wonder how they produce such amazing animated sprite-like characters.**

The days of designing sprites on scraps of paper have long gone, and now all graphic artists and programmers have an array of tools and utilities they can call on to make the process much easier.

I first introduced the subject of sprites two and a half years ago in the July 1985 issue of *Electron User*. Since then we have had many requests for more information on this complex programming task.

In this article I'll present a sprite designer and next month we'll see how to print, move and animate our sprites on the screen.

Your first task is to enter and save the designer – the listing accompanying this article. Once this is done you can create some sprites for next month's machine code routines to manipulate.

When the designer is run you'll be presented with the working screen. This shows the sprites you are working on, the current pen colour, pen status, sprite number and large, magnified copy of the current sprite. Figure 1 shows what the screen looks like during an editing session and clearly indicates the position of all the sprites, along with the designer's status.

When you first run the program you won't have any sprites on the screen, so let's create some.

All your drawing is carried out on the large magnified sprite in the centre of the screen. You can move the cursor using the cursor keys, set a pixel by pressing Copy and delete one by pressing Delete.

At the moment the pen is up, so you can freely move the cursor round the screen without drawing anything. Press P to put the pen down and move the cursor around – you'll see that it now leaves a trail in the current pen colour.

This mode is useful for painting large areas of the sprite. One point to watch out for though – you can't delete anything by pressing Delete with the pen down as it draws the point again immediately you've deleted it. Either lift the pen up by pressing P again or select the background colour for the pen.

The currently selected pen colour can be changed by tapping the C key. All subsequent plotting with Copy or drawing with the pen down will be in the colour indicated.

You can fill the four available pens with different inks – equivalent to VDU 19 in Basic – by pressing I. You'll first be asked to input the pen number, followed by the new ink, 0-15.

If you've been experimenting with the commands so far you'll have noticed that whatever you draw in the large editing box is also repeated on a small scale in the top left corner of the screen. This is the sprite you are designing real-size.

You can work on up to four at any one time so let's leave sprite zero, the default one, and create sprite one. Press number 1 and after a slight delay you'll be presented with a clean editing box.

Now design a new sprite.

*Designing a sprite*

| | |
|---|---|
| **Cursor keys** | Move the cursor. |
| **0-3** | Select a sprite. |
| **Shift+0-3** | Copy the current sprite to 0-3. |
| **AZ<>** | Scroll the sprite up, down, left and right. |
| **P** | Pen up or down. |
| **Copy** | Set a pixel. |
| **Delete** | Delete a pixel. |
| **S** | Save current sprite. |
| **L** | Load current sprite. |
| **C** | Select pen colour. |
| **I** | Select ink (VDU 19). |
| **N** | New sprite. |

At any time you can press 0 to go back to the first sprite and 1 again to edit the second one.

When designing animated sprites with say, four frame animation, the frames are often very similar and usually there are just one or two changes each time.

To save time and effort, the current sprite you are working on can be copied to any other sprite by pressing Shift+0–4. If you are still working on sprite one press Shift+2 and it will be copied to sprite two. Don't forget you are still working on sprite one – if you want to work on this new sprite frame you'll have to press 2.

If at any time, you wish to completely erase a sprite and start all over again press N – New. Once this is done you can't get it back again so take care. Remember though, you can copy the current sprite to another one for safekeeping before erasing it.

All that remains is loading and saving. Press S to save the current sprite. Now use the cursor keys to enclose the portion of the sprite you wish to save – you don't need to save all of it. Press Return to confirm and then enter the filename at the prompt.

It's always best to position the sprite in the top left corner of the editing box before saving it, otherwise you'll also be saving a lot of empty space. So before pressing S, (in fact, you can position it at any time) you can move it using <, >, * and ? to scroll it around the editing box.

Loading is much simpler – all you need to do is press L and enter the filename.

These commands always act on just the currently selected sprite, so first press 0-3 to select the one to load or save before pressing S or L.

Take care when inputting the filename as an error may cause the program to stop and display an error message, all you're work will then be lost. You can abort the command by just pressing Return when prompted for the filename.

● *That just about covers all the designer's commands. Table 1 gives a brief summary. Your task now is to create four sprites for next month, when I'll present a machine code sprite print routine.*

```
   10 REM Sprite Designer
   20 REM By R.A.Waddilove
   30 REM (c) Electron User
   40 ON ERROR OSCLI"FX178,2
55":OSCLI"FX4":REPORT:PRINT
" at line ";ERL:OSCLI"FX12,4
":END
   50 MODE 5
   60 PROCinitialise
   70 PROCscreen
   80 PROCedit
   90
  100 DEF PROCinitialise
  110 *FX16
  120 *FX4,1
  130 *FX12,7
  140 VDU 19,15,7;0;
  150 VDU 23,255,248,136,136
,136,248;0;
  160 VDU 23,254;112,112,112
,0;0;
  170 VDU 23;8202;0;0;0;
  180 ENDPROC
  190
  200 DEF PROCscreen
  210 DRAW 0,140:DRAW 1278,1
40:DRAW 1278,0:DRAW 0,0
  220 MOVE 190,712:DRAW 990,
712:DRAW 990,180:DRAW 190,18
0:DRAW 190,712
  230 COLOUR 15:PRINT TAB(1,
6)"0    1    2    3"TAB(12,3
0)"PenUp"TAB(1,28)"Sprite:0"
TAB(1,30)"Pen:";:COLOUR 1:PR
INT;1
  240 x%=0:y%=0:S%=0:O%=0:C%
=1:P%=0
  250 ENDPROC
  260
  270 DEF PROCedit
  280 opt$=" m!""#0123SLN?C]
,.:/"
  290 REPEAT k$=INKEY$9:PROC
cursor(0)
  300 K%=INSTR(opt$,k$):IF K
%>1 THEN ON K%-1 GOSUB 1040,
1040,1040,1040,420,420,420,4
20,690,910,550,600,480,1130,
1190,1280,1380,1470
  310 K%=ASC k$:IF K%=127 PR
OCplot(0)
  320 IF K%=136 x%=x%+(x%>0)
   ELSE IF K%=137 x%=x%-(x%<23
) ELSE IF K%=139 y%=y%+(y%>0
) ELSE IF K%=138 y%=y%-(y%<3
1)
  330 PROCcursor(15):IF P% O
R K%=135 PROCplot(C%)
  340 UNTIL FALSE
  350 ENDPROC
  360
  370 DEF PROCcursor(C%):GCO
L0,C%:MOVE 200+x%*32,700-y%*
16:VDU5,255,4:ENDPROC
  380
  390 REM ***** Colour *****
  400 C%=(C%+1)MOD4:COLOUR C
%:PRINT TAB(5,30);C%;" ":RET
URN
  410
  420 REM *** New Sprite ***
  430 S%=VAL k$:COLOUR 15:PR
INT TAB(8,28)k$
  440 REM ** Print Sprite **
  450 O%=S%*1280OR4:*FX178
  460 VDU 26,24,192;184;980;
710;16;26
  470 FOR x%=0 TO 23
  480 FOR y%=0 TO 31
  490 Z%=POINT(O%+x%*8,991-y
%*4):IF Z% PROCplot(Z%)
  500 NEXT
  510 NEXT
  520 x%=0:y%=0:*FX178,255
  530 RETURN
  540
  550 REM ****** New *******
  560 FOR C%=1 TO 4:PRINT TA
B(S%*5,1%)"   ":NEXT
  570 VDU 26,24,192;184;980;
710;16;26
  580 RETURN
  590
  600 REM ****** Pen *******
  610 P%=NOT P%:COLOUR 15
  620 PRINT TAB(15,30);:IF P
% PRINT"Down" ELSE PRINT"Up
"
  630 RETURN
  640
  650 DEF PROCplot(C%)
  660 GCOL 0,C%:PLOT 69,O%+x
```

**Turn to Page 35 ▶**

# The Life Of Repton

REPTON AS A BABY

REPTON AT SCHOOL

REPTON AS A TEENAGER

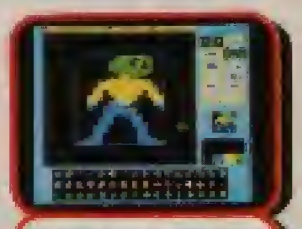
REPTON AT WORK

REPTON AS AN OLD MAN

Repton fans have begged, cajoled and pleaded with us to release another set of screens for our Repton 3 game. How could we refuse? Our lovable hero returns again to star in 40 new screens that vividly depict Repton's life-story.

The Five Ages of Repton:— At first we see Repton as a baby: a mewling infant surrounded by teddy-bears, humpy-dumptys, and aggressive clockwork toy-soldiers. Then Repton is a whining school-boy, creeping like snail unwillingly to school, with his pens, his calculator, and a bundle of homework. And then Repton during his teenage years becomes a spikey-haired punk armed with a ghetto-blaster and a collection of records. Then Repton goes to work: we see a harried office-manager amidst computers, photocopiers, and endless cups of coffee. Last scene of all, that ends this strange eventful history, is Repton as an old-age pensioner searching for his false-teeth, his spectacles, his "pint of stout", and his well-polished war-medals.

THE SCREEN EDITOR



THE CHARACTER EDITOR

**Each copy of The Life Of Repton includes:**
● the Repton 3 main program ● the Repton 3 editor and ● the 40 new game screens

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The screen pictures show the BBC Micro version of the game

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◀ From Page 33

```
%*8,991-y%*4:MOVE 200+x%*32,
700-y%*16:VDU5,254,4
  670 ENDPROC
  680
  690 REM ****** Save ******
  700 A%=&5940+S%*80
  710 x%=0:y%=0
  720 GCOL 3,15
  730 REPEAT
  740 MOVE 200,700-(y%+1)*16
:DRAW 200+(x%+1)*32,700-(y%+
1)*16:DRAW 200+(x%+1)*32,700
  750 K%=GET:*FX21
  760 MOVE 200,700-(y%+1)*16
:DRAW 200+(x%+1)*32,700-(y%+
1)*16:DRAW 200+(x%+1)*32,700
  770 x%=x%+(K%=136 AND x%>0
)-(K%=137 AND x%<23):y%=y%+(
K%=139 AND y%>0)-(K%=138 AND
 y%<31)
  780 UNTIL K%=13 AND x%+y%>
0
  790 IF x% x%=x% DIV4
  800 B%=&B02:?&B00=x%:?&B01
=y%
  810 FOR X%=0 TO x%
  820 FOR Y%=0 TO y%
  830 ?B%=?(A%+X%*8+&140+(Y%
DIV8)+Y%MOD8)
  840 B%=B%+1
  850 NEXT
  860 NEXT
  870 PROCinput("Save:"):IF
name$="" THEN RETURN
  880 OSCLI"SAVE "+name$+" 3
00 "+STR$"(&%-&500)
  890 RETURN
  900
  910 REM ****** Load ******
  920 A%=&5940+S%*80
  930 PROCinput("Load:"):IF
name$="" THEN RETURN
  940 OSCLI"LOAD "+name$+" 3
00"
  950 B%=&B02
  960 FOR X%=0 TO ?&B00
  970 FOR Y%=0 TO ?&B01
  980 ?(A%+X%*8+&140+(Y%DIV8
)+Y%MOD8)=?B%
  990 B%=B%+1
 1000 NEXT
 1010 NEXT
 1020 GOTO 440
 1030
 1040 REM ****** Copy ******
 1050 A%=&5940+S%*80:B%=&594
0+(K%-2)*80
 1060 FOR Y%=0 TO 3
 1070 FOR X%=0 TO 44 STEP 4
 1080 !(B%+X%+Y%*&140)=!(A%+
X%+Y%*&140)
 1090 NEXT
 1100 NEXT
 1110 RETURN
 1120
 1130 REM ***** VDU 19 *****
 1140 PROCinput("Pen:"):A%=V
AL name$
 1150 PROCinput("New ink:"):
B%=VAL name$
 1160 VDU 19,A%,B%;0;
 1170 RETURN
 1180
 1190 REM ** Left Scroll ***
 1200 *FX178,0,0
 1210 FOR X%=1 TO 24
 1220 FOR Y%=0 TO 31
 1230 GCOL 0,POINT(X%*8+0%,9
91-Y%*4):PLOT 65,-8,0
 1240 NEXT
 1250 NEXT
 1260 GOTO 440
 1270
 1280 REM ** Right Scroll **
 1290 *FX178,0,0
 1300 FOR X%=22 TO 0 STEP -1
 1310 FOR Y%=0 TO 31
 1320 GCOL 0,POINT(X%*8+0%,9
91-Y%*4):PLOT 65,8,0
 1330 NEXT
 1340 NEXT
 1350 GCOL0,0:MOVE 0%,991:DR
AW 0%,991-31*4
 1360 GOTO 440
 1370
 1380 REM *** Up Scroll ****
 1390 *FX178
 1400 FOR Y%=1 TO 32
 1410 FOR X%=0 TO 23
 1420 GCOL 0,POINT(X%*8+0%,9
91-Y%*4):PLOT 65,0,4
 1430 NEXT
 1440 NEXT
 1450 GOTO 440
 1460
 1470 REM ** Down Scroll ***
 1480 *FX178
 1490 FOR Y%=30 TO -1 STEP-1
 1500 FOR X%=0 TO 23
 1510 GCOL 0,POINT(X%*8+0%,9
91-Y%*4):PLOT 65,0,-4
 1520 NEXT
 1530 NEXT
 1540 GOTO 440
 1550
 1560 DEF PROCinput(prompt$)
 1570 VDU23,1,1;0;0;0;
 1580 COLOUR143:COLOUR0:PRIN
TTAB(0,8)SPC19;CHR$13;prompt
$;:INPUT"name$
 1590 VDU 23;8202;0;0;0;
 1600 COLOUR128:COLOUR15:PRI
NTTAB(0,8)SPC20
 1610 ENDPROC
```

**This listing is included in this month's cassette tape offer. See order form on Page 53.**


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# MATHEW O'DONNELL presents a clever game of navigation in deepest space

**EXPLORE the reaches of unknown space in this superb arcade simulation of galactic flight.**

Beyond the depths of the Crab nebula, in the darkness of Teinazures gate, lie the Straits of Magellan – an uncharted region of space spanning an unknown distance.

In the ancient scriptures of your planet it is written that a rich and profitable trading route once spanned the length of the strait, joining the moons of Andromeda with the shoulder of Orion.

Many thousands of years ago however, during a terrible war, an entire planet was destroyed and now leaves a legacy of deadly asteroids floating in the narrow passageway of the strait.

The supreme council assembles and calls in you, Sebastian Jones, their finest star pilot and navigator extraordinaire.

His eminence, the Katarn explains that a priceless religious artefact, the Orb of Wisdom, has been stolen from the great temple.

The traitor has escaped along the Straits of Magellan, presumed to be heading for Rigel.

Although you've never held much store by antiquities in the past, the offer of a hefty purse and instant fame appeals to you immediately.

Dare you venture into the most treacherous region of space to recover the Orb? Only you will know as you play Navigator.

The object of the game is to get from the top left of each screen to the exit gate at the bottom right. This is achieved by moving left and right through the obstacles using the thrust key (Shift) to control your speed.

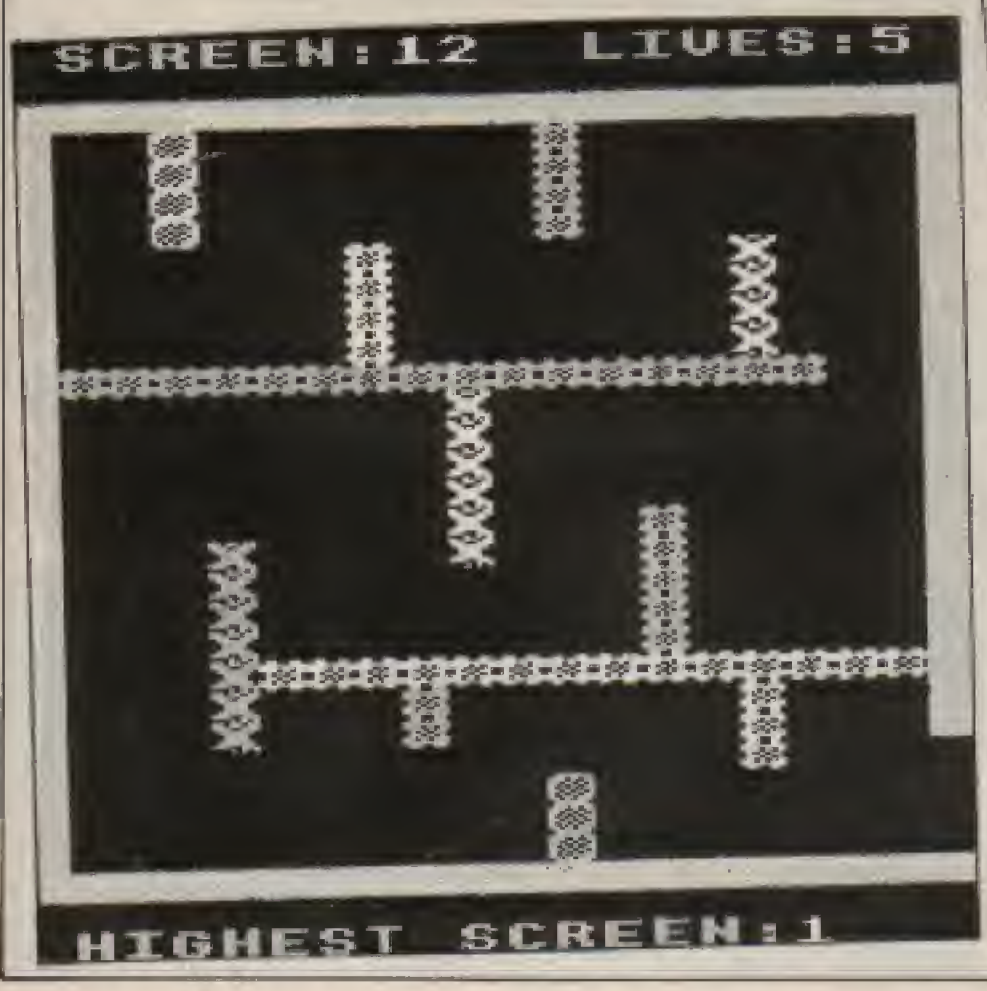
Be careful not to thrust in any direction for too long, because due to inertia the spacecraft keeps moving for a long time.

Crashing into the walls of the Straits or the asteroids is fatal, and you only have five lives.

And even though Navigator is less than 2.5k long it has no less than six mazes and a virtually infinite number of asteroid-infested screens.

Mazes appear on the even numbered levels up to level 12, each more challenging than the last.

This remarkable game demonstrates the real power of Electron Basic. ■




**PROCEDURES**

**init** Initialise game
**instruct** Display instructions

**VARIABLES**

**L%** Lives remaining
**V%** True if game paused
**S%** Current screen
**H%** Highest screen reached
**X%** X position of ship
**Y%** Y position of ship

```
  10 REM Navigator
  20 REM by Mathew O'Donnell
  30 REM (c) Electron User ..
  40 PROCinit
  50 REPEAT
  60 MODE5
  70 PROCinstruct
  80 REPEAT
  90 X%=64:Y%=892
 100 FOR P=0 TO 999:NEXT
 110 VDU 12,19,2,3;0;
 120 VDU 17,1,17,130
 130 FOR P=3 TO 29
 140 VDU 31,0,P,225
 150 VDU 31,19,P,225
 160 IF P=3 OR P=29 PRINTTA
B(1,P)STRING$(18,CHR$225):NE
XT ELSE NEXT
 170 VDU 17,128,31,1,1
 180 PRINT"SCREEN:    LIVES
:";TAB(1,31)"HIGHEST SCREEN:
";
 190 VDU 17,2,31,8,1
 200 PRINT;S%;TAB(18,1);L%;
TAB(16,31);H%;
 210 IF INT(S%/2)<>S%/2 OR
S%>12 FOR P%=1 TO (S%*3)+2:C
OLOURRND(2):PRINTTAB(RND(16)
+1,RND(25)+3)CHR$(RND(3)+225
):NEXT:GOTO 350
 220 RESTORE
```

*Turn to Page 38* ►

# Game

◀ From Page 37

```
  230 REPEAT
  240 READ a%,b%,c%
  250 UNTIL a%=$%+50
  260 REPEAT READ a%,b%,c%
  270 COLOUR RND(2)
  280 PRINT TAB(a%,b%)STRING
$(c%,CHR$(RND(3)+225))
  290 UNTIL c%=0
  300 REPEAT
  310 READ a%,b%,c%
  320 COLOUR RND(2)
  330 PRINT TAB(a%,b%)STRING
$(c%,CHR$(RND(3)+225)+CHR$10
+CHR$8)
  340 UNTILc%=0
  350 PRINT TAB(19,25)STRING
$(4,CHR$32+CHR$8+CHR$10)
  360 VDU 5,18,3,3
  370 VDU 25,4,X%;Y%;224
  380 E%=0:T%=1:K%=0:G%=0
  390 REPEAT
  400 N%=X%:M%=Y%
  410 K%=K%+((INKEY(-98)AND
K%>-32)-(INKEY(-67)AND K%<32
))*4
  420 G%=G%-((G%<20)+2)
  430 X%=X%+K%:Y%=Y%-G%
  440 IF INKEY(-1):IF G%>-30
:G%=G%-4
  450 Q%=POINT(X%+16,Y%)
  460 R%=POINT(X%+40,Y%)
  470 I%=POINT(X%,Y%-12)
  480 O%=POINT(X%+56,Y%-12)
  490 A%=POINT(X%+8,Y%-28)
  500 D%=POINT(X%+48,Y%-28)
  510 IF Q%=1 OR Q%=2 OR R%=
1 OR R%=2 ORI%=1 OR I%=2 OR
O%=1 OR O%=2 OR A%=1 OR A%=2
 OR D%=1 OR D%=2:E%=-1:T%=0:
SOUND0,-15,4,17
  520 V%=INKEY(-56)
  530 REPEAT
  540 UNTIL V%=0 OR INKEY(-5
2)
  550 MOVE N%,M%:VDU224
  560 MOVE X%,Y%:VDU224
  570 UNTIL X%>1260 OR E%=-1
  580 VDU4
  590 L%=L%+E%:S%=S%+T%
  600 J%=(S%>H%)
  610 H%=-S%*J%-(H%*NOT J%)
  620 UNTIL L%=0
  630 VDU 17,3,20,1,16,10,14
,12
  640 PRINT" G A M E  O V E
R"
  650 FOR P=0 TO 3000:NEXT
  660 UNTILO
  670 ;
  680 DEF PROCinit
  690 VDU23,224,102,255,102,
255,126,219,153,66
  700 VDU 23,226,126,235,213
,171,213,171,215,126
  710 VDU 23,225,170,85,170,
85,170,85,170,85
  720 VDU 23,227,102,255,235
,86,106,215,255,102
  730 VDU 23,228,219,231,126
,60,60,126,231,21
  740 H%=1
  750 ENDPROC
  760 :
  770 DEF PROCinstruct
  780 VDU 23;8202;0;0;0;
  790 VDU 19,3,6;0;
  800 VDU 19,1,5;0;
  810 VDU 31,5,6
  820 PRINT"NAVIGATOR"
  830 VDU 17,2
  840 PRINT''SPC7"Z - Left"
 SPC7"X - Right""SPC3"Shif
t - Thrust""SPC7"P - Pause"
"SPC7"R - Resume"
  850 ?&212=&D6
  860 ?&213=&F1
  870 ?&2AC=0
  880 *FX16
  890 *FX15
  900 VDU 17,1,31,3,22
  910 PRINT " Hit any key"
  920 REPEAT UNTIL GET
  930 CLS:S%=1:L%=5
  940 ENDPROC
  950 :
  960 DATA 52,0,0,1,12,5
  970 DATA 10,11,4,4,18,6
  980 DATA 14,22,5,6,26,4
  990 DATA 0,0,0,0,0,0,56
 1000 DATA 0,0,4,11,10,0
 1010 DATA 0,0,3,4,20,7
 1020 DATA 17,12,13,12,12
 1030 DATA 16,20,9,0,0,0
 1040 DATA 58,0,0,1,19,5
 1050 DATA 4,13,4,4,24,4
 1060 DATA 7,8,3,12,11,4
 1070 DATA 15,16,4,12,23
 1080 DATA 4,0,0,0,3,4,10
 1090 DATA 8,13,12,11,8
 1100 DATA 21,0,0,0,60,0
 1110 DATA 0,1,8,15,4,13
 1120 DATA 15,1,18,15,4
 1130 DATA 23,15,0,0,0,6
 1140 DATA 24,1,12,24,1,9
 1150 DATA 28,1,15,28,1,0
 1160 DATA 0,0,62,0,0,1
 1170 DATA 12,16,4,22,15
 1180 DATA 0,0,0,4,18,7,3
 1190 DATA 4,4,7,8,4,11,4
 1200 DATA 4,15,8,4,9,13
 1210 DATA 6,13,17,5,8,23
 1220 DATA 2,11,24,3,15
 1230 DATA 23,3,0,0,0,54
 1240 DATA 0,0,0,0,0,3,13
 1250 DATA 5,6,5,7,8,10,6
 1260 DATA 11,10,6,13,20
 1270 DATA 9,4,22,7,16,12
 1280 DATA 7,0,0,0
```

*This listing is included in this month's cassette tape offer. See order form on Page 53.*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# SUPER DIGGA

**Get your spade arm into action with STEVEN MARTIN's super maze game**

**THE forces of evil have once more transported an unwitting mortal down to their fiendish underground maze to satisfy some terrible purpose.**

You are that mortal, and before you can escape to breathe fresh air again, your intellect, speed and endurance will be stretched to breaking point.

In this all-action machine code game, you are faced with the task of collecting every diamond buried in the maze with you before ascending to the next highest cave, and – hopefully – eventual freedom.

This is no simple task, as you are surrounded by vicious maze munchers who take great umbrage at the thought of their precious booty being lifted from under their yellow noses.

To make matters worse, the maze is full of magic mushrooms just itching to brush their fungal feelers against you and sting you into oblivion.

And as if that weren't enough, some joker has poured a truckful of rocks down the cave. Negotiating your way past these while being pursued by a frenzied monster certainly raises the blood pressure.

It's not all plain sailing for the monsters, though, as you can decide at the start how fast you want everything to move through the maze.

You control your small figure from the keyboard and can pause the action at any time by pressing P.

Your score, together with the number of remaining diamonds and lives, is shown below the maze. Each new cave contains more diamonds than the last – and the monsters get smarter.

*Turn to Page 43* ▶

## PROCEDURES

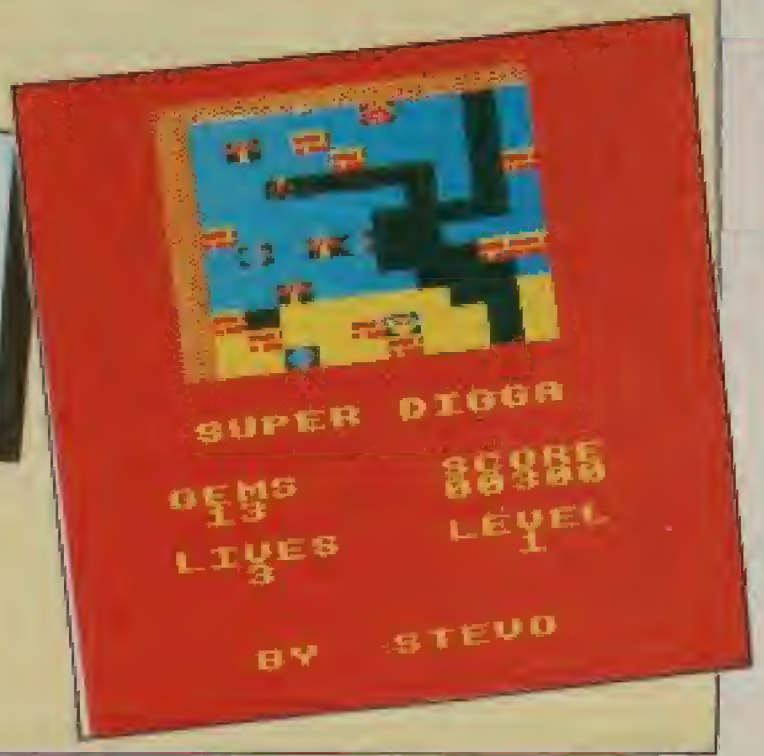
| | |
|---|---|
| **assem** | Poke in the machine code |
| **initmaze** | Set up screen map |
| **initgame** | Set up memory locations |
| **left** | Scroll window left |
| **right** | Scroll window right |
| **up** | Scroll window up |
| **down** | Scroll window down |
| **dia** | Update diamonds left |
| **dead** | Update lives left |
| **maestro** | Print title screen |
| **welldone** | Play fanfare |

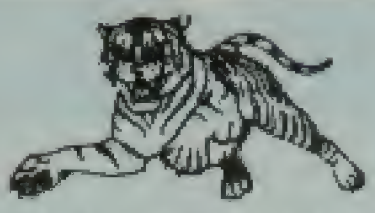
## VARIABLES

| | |
|---|---|
| **score%** | Current score |
| **lives%** | Number of lives remaining |
| **level%** | Current level |
| **dia%** | Number of diamonds left |
| **hi%** | High score |
| **man%** | Location of man |

## CONTROLS

| | |
|---|---|
| Z | Left |
| X | Right |
| * | Up |
| ? | Down |
| P | Pause |





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DATABASE PUBLICATIONS

◀ From Page 39

```
  10 REM Super Digga
  20 REM BY STeven Martin
  30 REM (c) Electron User
  40 REM
  50 MODE5:PROCassem:INPUTTAB(3,5);"SPEED 0-10:";S:IF S<0 OR S>10 THEN 50 ELSES=((10-S)*10):CALLstevo2:PRINTTAB(1,5);"FABULOUS SONICS?";A$=GET$:CALLstevo2:IF A$="N" OR A$="n":*FX21,0,10
  60 VDU23,1,0;0;0;0;19,3,6;0;:hi%=1000:ENVELOPE1,129,-122,-54,-94,97,22,21,126,0,0,-126,126,126:ENVELOPE2,129,15,-123,110,233,84,48,126,0,0,-126,126,126:ENVELOPE3,129,-84,42,-70,247,230,156,126,0,0,-126,126,126
  70 PROCmaestro:?&7E=0:score%=0:lives%=3:level%=1
  80 PROCinitmaze:PROCgraphics
  90 PROCinitvari:PROCinitgame:CALLstevo:PROCscreen:PROCgame:END
 100 DEFPROCassem:DIM Q% 1200:FORT=0TO2STEP2:P%=Q%:[OPTT
 110 .mainloop:LDX#&C8:LDA#&81:LDY#&FF:JSR&FFF4:TYA:BNEpause:JSRghosties:JSRrocks:JSRwindow:RTS:.pause:LDA#21:LDX#0:JSR&FFF4:JSR&FFE0:JMPmainloop
 120 .window:LDX#12:.row:JSRstart:CLC:LDA&70:ADC#&90:STA&70:LDA&71:ADC#0:STA&71:LDA&74:CLC:ADC#20:STA&74:LDA&75:ADC#0:STA&75:DEX:BPLrow:RTS
 130 .start:LDY#10:.fill:STY&8F:LDA(&74),Y:CMP#55:BNES1:JMPbord:.S1:CMP#52:BNES2:JMPman:.S2:CMP#51:BNES3:JMProck:.S3:CMP#50:BNES4:JMPtoad:.S4:CMP#49:BNES5:JMPdia:.S5:CMP#56:BNES6:JMPearth1:.S6:CMP#57:BNES7:JMPearth2:.S7:CMP#53:BNES8
 140 JMPalien:.S8:CMP#54:BNES9:JMPbrick:.S9:JMPspace:.ret:LDY&8F:DEY:BPLfill:RTS
 150 .earth1:LDA#&FF:LDY#15:.elp1:STA(&70),Y:DEY:BPLelp1:JSRinc:JMPret:.earth2:LDA#&80:LDY#15:.elp2:STA(&70),Y:DEY:BPLelp2:JSRinc:JMPret
 160 .brick:LDA#&90:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret:.man:LDA#&A0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret:.dia:LDA#&B0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret
 170 .toad:LDA#&C0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret:.bord:LDA#&F0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret
 180 .alien:LDA#&E0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret:.rock:LDA#&D0:STA&72:LDA#&0A:STA&73:JSRpaint:JSRinc:JMPret:.space:LDY#15:.loop2:LDA#0:STA(&70),Y:DEY:BPLloop2:JSRinc:JMPret
 190 .paint:LDY#15:.loop:LDA(&72),Y:STA(&70),Y:DEY:BPLloop:RTS:.inc:LDA&70:CLC:ADC#16:STA&70:LDA&71:ADC#0:STA&71:RTS
 200 .moveghost:LDX#0:LDA&82:STA(&80),Y:JSR&AF51:LDA&2A:CMP#50:BCSsmall:JSR&AF51:LDA&2A:STA&83:.small:LDA&83:CMP#200:BCCover:JSRup:.over:CMP#150:BCCover1:JSRdown:.over1:CMP#100:BCCover2:JSRleft:.over2
 210 CMP#50:BCCcheck:JSRright:.check:LDY#0:LDA(&80),Y:CMP#52:BEQbri:CMP#48:BEQnegative:CMP#56:BEQnegative:CMP#57:BEQnegative:JSRchangedirec:JMPnegative:.bri:LDA#1:STA&7E:RTS
 220 .negative:LDY#0:LDA(&80),Y:STA&82:LDA#53:LDY#0:STA(&80),Y:RTS
 230 .changedirec:LDA&83:CMP#200:BCSdown:CMP#150:BCSup:CMP#100:BCSright:CMP#50:BCSleft:JSR&AF51:LDA&2A:STA&83:RTS:.up:SEC:LDA&80:SBC#20:STA&80:LDA&81:SBC#0:STA&81:RTS
 240 .down:CLC:LDA&80:ADC#20:STA&80:LDA&81:ADC#0:STA&81:RTS:.right:CLC:LDA&80:ADC#1:STA&80:LDA&81:ADC#0:STA&81:RTS:.left:SEC:LDA&80:SBC#1:STA&80:LDA&81:SBC#0:STA&81:RTS
 250 .ghosties:LDY#2:.glp:LDA&D01,Y:STA&80:LDA&D04,Y:STA&81:LDA&D07,Y:STA&82:LDA&D0A,Y:STA&83:STY&84:JSRmoveghost:LDY&84:LDA&80:STA&D01,Y:LDA&81:STA&D04,Y:LDA&82:STA&D07,Y:LDA&83:STA&D0A,Y:DEY:DEY:BPLglp:RTS
 260 .stevo:LDY#2:.club:TYA:STA&80:STY&81:JSRc:LDY&81:INY:CMP#7:BNEclub:LDA#&0F:STA&80:JSRc:RTS:.c:LDA#&5B:STA&71:LDY#0:LDA#&00:STA&70:LDA&80:.cl:STA(&70),Y:INY:BNEcl:INC&71:BPLcl:RTS
 270 .rocks:LDX#5:.rockloop:LDA&0D0,X:STA&80:LDA&D13,X:STA&81:JSRrockcheck:LDA&80:STA&D0D,X:LDA&81:STA&D13,X:DEX:BPLrockloop:RTS
 280 .rockcheck:LDA&80:CLC:ADC#20:STA&85:LDA&81:ADC#0:STA&86:LDY#0:LDA(&85),Y:CMP#48:BEQfalling:.rockend:LDA#51:LDY#0:STA(&80),Y:RTS:.falling:LDA#48:LDY#0:STA(&80),Y:LDA&85:STA&80:LDA&86:STA&81
 290 LDA&85:CLC:ADC#20:STA&85:LDA&86:ADC#0:STA&86:LDY#0:LDA(&85),Y:CMP#52:BNEalive:LDA#1:STA&7E:.alive:JMProckend
 300 .stevo2:LDA#254:STAmask:.inloop:JSRpixfix:LDAmask:LSRA:STAmask:CMP#0:BNEinloop:RTS:.pixfix:LDA#&58:STA&71:LDY#0:LDA#&00:STA&70:.pixlp:LDA(&70),Y:ANDmask:STA(&70),Y:INY:BNEpixlp:INC&71:BPLpixlp:RTS:.mask
 310 RTS:]:NEXT:ENDPROC
 320 DEFPROCinitmaze:FORT%=&900TO(&900+Z80):?T%=56:?(T%+190)=57:NEXT:FORT%=&900TO(&900+20):?T%=55:?(T%+300)=55:NEXT:FORT%=&900TO(&900+300)STEP20:?T%=55:?(T%-1)=55:NEXT:dia%=0:po%=0:FORT%=1TO20
 330 po%=RND(300):IF po%=217 OR po%=268 OR po%=336 THEN 330
 340 IF ?(po%+&900)=57 OR ?(po%+&900)=56 THEN dia%=dia%+1:?(po%+&900)=49
 350 po%=RND(300):IF ?(po%+&900)=57 OR ?(po%+&900)=56 THEN ?(po%+&900)=54
 360 NEXT
 370 T%=0:REPEAT:po%=RND(300):IF ?(po%+&900)=57 OR ?(po%+&900)=56 THEN ?(po%+&900)=50
 380 T%=T%+1:UNTIL T%=10
 390 T%=0:REPEAT
 400 po%=RND(300):IF ?(po%+&900)=57 OR ?(po%+&900)=56 THEN ?(po%+&900)=51:po%=po%+&900:T%?&0D0=po% MOD 256:T%?&0D13=po% DIV 256
 410 T%=T%+1:UNTIL T%=5:ENDPROC
 420 DEFPROCgraphics:RESTORE850:FORT%=&A90TO&AFF:READD$:D%=EVAL("&"+D$):?T%=D%:NEXT
 430 RESTORE840:FORT=0TO2
 440 READL%:T?&0D1=L% MOD 256:T?&0D04=L% DIV 256:T?&0D7=RND(255):IFT?&D7%=53 OR T?&D7%=52:GOTO440 ELSE-T?&D0A=?L%:NEXT:ENDPROC
 450 DEFPROCinitvari:loc%=&907:man%=&91E:X%=13:Y%=2:xmax%=19:xmin%=12:ymax%=8:ymin%=3:ENDPROC
 460 DEFPROCinitgame:?&70=&C0:?&71=&5A:?&74=&C0:?&75=&54:ENDPROC
 470 DEFPROCgame:REPEAT:FORT=1TO5:NEXT:CALLQ%:IF?&7E=1:PROCdead
 480 IFINKEY-98:PROCleft:GOTO520
 490 IFINKEY-67:PROCright:GOTO520
 500 IFINKEY-73:PROCup:GOTO520
 510 IFINKEY-105:PROCdown
 520 ?&74=loc% MOD 256:?&75=loc% DIV 256:?&70=&C0:?&71=&54:?man%=52:UNTIL FALSE
 530 DEFPROCleft:IF?(man%-1)=55 OR ?(man%-1)=51 OR ?(man%-1)=54:ENDPROC
 540 IF?(man%-1)=49:PROCdia
 550 IF?(man%-1)=50 OR ?(man%-1)=53:PROCdead
 560 IFX%<xmin%:?man%=48:man%=man%+1:X%=X%-1:xmin%=xmin%-1:xmax%=xmax%-1:ENDPROC
 570 ?man%=48:man%=man%+1:loc%=loc%+1:X%=X%-1:ENDPROC
 580 DEFPROCright:IF?(man%+1)=55 OR ?(man%+1)=51 OR ?(man%+1)=54:ENDPROC
 590 IF?(man%+1)=49:PROCdia
 600 IF?(man%+1)=50 OR ?(man%+1)=53:PROCdead
 610 IFX%>xmax%:?man%=48:man%=man%-1:X%=X%+1:xmax%=xmax%+1:xmin%=xmin%+1:ENDPROC
 620 ?man%=48:man%=man%-1:loc%=loc%-1:X%=X%+1:ENDPROC
 630 DEFPROCup:IF?(man%-20)=55 OR ?(man%-20)=51 OR ?(man%-20)=54:ENDPROC
 640 IF?(man%-20)=49:PROCdia
 650 IF?(man%-20)=50 OR ?(man%-20)=53:PROCdead
 660 IFY%<ymin%:?man%=48:man%=man%-20:Y%=Y%-1:ymin%=ymin%-1:ymax%=ymax%-1:ENDPROC
 670 ?man%=48:man%=man%-20:loc%=loc%-20:Y%=Y%-1:ENDPROC
 680 DEFPROCdown:IF?(man%+20)=55 OR ?(man%+20)=51 OR ?(man%+20)=54:ENDPROC
 690 IF?(man%+20)=49:PROCdia
 700 IF?(man%+20)=50 OR ?(man%+20)=53:PROCdead
 710 IFY%>ymax%:?man%=48:man%=man%+20:ymin%=ymin%+1:ymax%=ymax%+1:Y%=Y%+1:ENDPROC
 720 ?man%=48:man%=man%+20:loc%=loc%+20:Y%=Y%+1:ENDPROC
 730 DEFPROCscreen:COLOUR129:CLS:PRINTTAB(4,17)"SUPER DIGGA";TAB(3,20);"GEMS";SPC(4);"SCORE";TAB(4,21);dia%;TAB(11,21);"00000";TAB(3,23)"LIVES";SPC(3);"LEVEL";TAB(5,24);lives%;SPC(7);level%;TAB(5,28);"BY  STEVO":L%=LEN(STR$(score%))
 740 PRINTTAB(16-L%,21);score%:ENDPROC
 750 DEFPROCdia:SOUND&11,1,255,5:dia%=dia%-1:score%=score%+100:IFdia%=0:PROCwelldone
 760 L%=LEN(STR$(score%)):PRINTTAB(4,21);SPC(2);TAB(4,21);dia%;TAB(16-L%,21);score%:ENDPROC
 770 DEFPROCdead:SOUND&11,3,255,5:?man%=48:lives%=lives%-1:PRINTTAB(5,24);SPC(2);TAB(5,24);lives%:IFlives%=0THEN790
 780 ?&7E=0:GOTO90
 790 PRINTTAB(4,8);SPC(11);TAB(4,9);" GAME OVER ";TAB(4,10);SPC(11):FORT=1TO8000:NEXT:IFscore%>hi% THEN hi%=score%
 800 GOTO70
 810 DEFPROCmaestro:CLS:COLOUR2:PRINTTAB(4,3);"SUPER DIGGA":COLOUR3:PRINTTAB(4,9);"I  -  LEFT";TAB(4,11);"X  -  RIGHT";TAB(4,13);":  -  UP";TAB(4,15);"/  -  DOWN";TAB(4,17);"P  -  PAUSE";TAB(2,21);"HIGH SCORE:";hi%:COLOUR2
 820 PRINTTAB(2,26);"ANY KEY TO START":OSCLI("FX21,0"):A=GET:CALLstevo2:ENDPROC
 830 DEFPROCwelldone:SOUND&11,2,255,25:CALLstevo:COLOUR3:PRINTTAB(1,10)"LEVEL ";level%;" COMPLETED";TAB(5,17)"ENTERING";TAB(4,19)"NEXT STAGE":FORY=1TO1000:NEXT:level%=level%+1:GOTO80
 840 DATA2521,2572,2640
 850 DATAF0,0F,0F,0F,F0,20,20,20,F0,20,20,20,F0,0F,0F,0F,10,10,03,41,01,02,66,00,80,80,0C,28,08,04,66,00,11,33,77,FF,FF,77,33,11,88,4C,AE,0F,DF,AE,4C,88,03,27,4F,1F,10,10,10,10,0C,8E,4F,0F,80,80,80,80
 860 DATA03,36,0F,4F,1F,0F,27,03,C0,68,3C,1E,87,8F,0E,0C,88,B9,0A,C0,F8,34,21,10,11,09,B5,30,F1,C2,48,80,5A,45,5A,A5,5A,A5,5A,45,45,5A,45,5A,A5,5A,A5,5A
```

Exploring printers Part 2

# Printing in overdrive

**JULIA FORESTER runs a set of benchtests in Part 2 of her printer series for beginners**

**NO ONE could accuse a modern printer of being slow, yet in days not-so long past, when daisy-wheels and golf balls were more common, printing was a slow and laborious task.**

And before monitors became commonplace it used to be the only form of display. Unbelievable as it may now seem, computer programmers and operators had to work from paper printouts.

Thankfully, the days of the rattling teletype are little more than a faded memory – now we have to make do with luxuries like televisions, high-resolution colour monitors and so on.

Even so, there are still times when a hard copy of our work is required: The obvious instance is when we're sending a letter.

The document is prepared and edited in the computer, but unless we're able to use electronic mail it will have to be typed out on paper and sent by normal means: This involves using a printer.

Another case is listing programs. The monitor can only display a few lines at a time, 32 being the maximum on the Electron. However, when debugging our own programs we may need to look at areas many tens of lines apart.

This is where the hard copy is extremely useful. It's much easier to thumb through a few sheets of paper than to wade through line after line of screen output.

The Electron can transfer data at very high speed, but printers can only output it considerably more slowly. So, when the printer is busy, the computer has to wait before it sends more information – in effect the computer has to stop and wait for the printer to catch up.

To help overcome this, the Electron has a printer buffer built in. This is organised as a FIFO queue – take a look at the accompanying panel for an explanation.

Characters wait in the buffer until the printer sends a signal to inform the computer it's ready to receive more data. On the standard Electron the buffer is 63 characters long. However, there are addons such as ACP's 256k ram packs which can be configured as partial printer buffers.

Some printers have their own, modestly sized buffers and larger capacity external devices are available. One, the MicroStuffer, reviewed in the September 1987 issue of *Electron User*, provides a massive 64k buffer.

Such units store characters from the parallel port as fast as the computer can send them, leaving the computer free to carry on very quickly, and characters are output to the printer at the printer's speed. The problem with all such devices is that they don't come cheap.

In the final reckoning though, the speed of the printout is governed by the speed of the printer itself. Individual models vary considerably in how fast they operate. Manufacturers provide a lot of impressive sounding figures, but these can rarely be easily compared.

In fact, a lot of things govern how fast a printer is, not just the speed of its printing. For instance, there's the carriage speed – how fast the print head travels, and line feed – how fast the paper moves through the printer.

To compare speeds of a selection of printers I have devised a few simple benchtests. These programs produced the results shown in Table I. Rather than optimising the programs for a particular printer, all were run under the same conditions.

Program I is the most useful test. It gives the

```
   10 REM Program I
   20 REM Test in draft pica
   30 *FX 3 10
   40 TIME=0:FOR N=1 TO 11:P
RINT STRING$(80,"*"):NEXT:S%
=TIME
   50 *FX 3
   60 PRINT "Stop clock when
 printer stops":INPUT "Enter
 time in seconds "T
   70 PRINT "Run time:";S%/1
00;" seconds"
   80 cps=11/T:lph=3600*cps:
PRINT "Lines per minute:";lp
s*60
   90 PRINT"Characters per s
econd:";INT((80*11)/T)"Fanf
old pages per hour:"INT(lph/
66)
```

| Printer type | CPS draft/NLQ | LPM draft/NLQ | PPH draft/NLQ | Line feed in seconds | Head speed inches/sec | Price |
|---|---|---|---|---|---|---|
| Precision MH-4010 | 97/58 | 73/44 | 66/40 | 0.076 | 0.114 | £424.35 |
| Epson EX-800 | 80/40 | 60/30 | 54/27 | 0.076 | 0.125 | £550 |
| Panasonic KX-P1081 | 80/20 | 60/15 | 54/12 | 0.091 | 0.114 | £178.25 |
| Epson FX-80 | 58 | 44 | 40 | 0.152 | 0.159 | N/a |
| Amstrad DMP-3000 | 55 | 41 | 37 | 0.197 | 0.17 | £159 |

*Table I: Five dot matrix printers compared*

overall printing speed in pages per hour (PPH) lines per minute (LPM) and characters per second (CPS).

Program II is used to test

```
   10 REM Program II
   20 REM Test Line feed spe
ed
   30 @%=&20309
   40 VDU 2:TIME=0:FOR N=1 T
O 66:VDU 1,10:NEXT:VDU 3
   50 PRINT "Stop clock when
 printer stops":INPUT "Enter
 time in seconds "T
   60 feed=T/66
   70 PRINT"Line feed speed=
"feed;" seconds"
   80 @%=&90A
```

the speed of the line feed, and Program III to test the head travel speed – this determines how fast a printer can perform carriage returns.

```
   10 REM Program III
   20 REM Test head speed
   30 @%=&20309
   40 *FX 3,10
   50 TIME=0:FOR N=1 TO 11:P
RINT ".";STRING$(78," ");","
:NEXT:S%=TIME
   60 *FX 3
   70 PRINT "Stop clock when
 printer stops":INPUT "Enter
 time in seconds "T
   80 PRINT "Run time:";S%/1
00;" seconds"
   90 PRINT "Head speed=";(9
/11)/8;" inches per second"
```

Although not all printers had an NLQ feature, whenever possible Programs I and II were modified as appropriate and tested in this mode.

To use any of the the programs to test your own printer, type RUN, press Return and start timing simultaneously. Enter the time in seconds when prompted.

The results clearly show that you only get what you pay for. The fastest model proved to be the semi-professional Precision unit, which owes a lot to its four print heads.

Similarly Epson's EX-800 unit is fast, but very expensive although it does have a colour option. Of the cheaper units, the Panasonic provides excellent performance at a reasonable price.

Although none of the printers appear to have achieved their quoted speeds, it has to be remembered these figures are relative and not absolute.

For instance, the timings for CPS have not taken into account the extra time taken for line feeds. In spite of this, we feel these figures are the ones most likely to be duplicated in normal use.

● *In the next article we'll continue our investigation into the complexities of printers, examining graphics and bit image mode.*

*The Epson EX-800 colour printer*

## Buffers, queues and stacks

*The terms buffer, queue and stack are used very frequently in computing, but what do they actually mean?*

*Very often when computer devices talk to each other, one will send information faster than the other can process it. This is true for everything from the keyboard to the cassette interface.*

*A buffer is an area of memory controlled by the computer to act as a cushion. Characters wait in a buffer until they are required.*

*The argument for a buffer can be likened to a machine producing pies faster than the packer can remove them from the conveyor belt. Very soon, there'll be a disaster with all the pies ending up on the floor.*

*So the packer must have some way to stop this happening. He will tell the machine to stop making pies every time his hands are full. Similarly, a device can tell the computer when it's busy.*

*Since the packer can only hold one pie, the machine will spend a long time waiting for him to catch up.*

*Obviously this would not be very satisfactory, and one way to solve the problem would be to store the pies temporarily on a series of shelves – a buffer.*

*The machine could then make large batches of pies without having to wait. The larger the shelves – the bigger the buffer – the more pies can be made at a time.*

*Queues and stacks are two forms of buffer. The queue is a FIFO or first in, first out buffer. The example above is a queue. A stack, on the other hand is a LIFO or last in, first out buffer.*

*A dustbin is probably the simplest example of a stack buffer. As you throw your litter away it enters the bin and goes to the top of the pile.*

*The pile gets higher until the dustbin is full. When the bin is emptied, the last item to enter it is the first to be removed and vice versa.*

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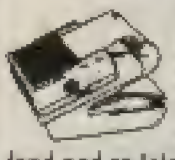

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# MICRO MESSAGES

## Preaching to the converted

*WHEN I first bought your magazine and read the Micro Messages section, I saw letter after letter starting with "I must congratulate you on having a fantastic magazine ...', and "What a brilliant magazine* Electron User *is ...".*

*At first I thought this was just a way of getting your letter printed, but after buying it for some months, I now realise that all the comments are true.*

*After typing in the Joystick Converter in the November 1987 issue, I found that it worked marvelously with Acornsoft's Magic Mushrooms and Meteors, Tynesoft's Phantom and Alligator's Blagger.*

*And there are probably many more games that can be introduced to the world of joystick control.*

*Finally, can you tell me how I can get the Electron's power socket fixed, as the computer keeps turning on and off while I am playing games?* – **Richard Smith, Chelmsford, Essex.**

● Letters are published because of their own merit and not because the flattery goes to the editor's head! The joystick converter proved very popular and we would like to hear from other readers who have found games which will work with it.

Fixing your power socket should be fairly simple. Check both wires for dry joints or fractured strands. Re-solder if necessary, but if the socket itself has worn out you can buy a replacement quite cheaply from most electrical spares shops.

## Santa's slip up

*CONCERNING the listing for Santa On The Tiles in the December 1987 issue of* Electron User, *I have double checked my programming, but still keep getting No such variable at line 810. If there is a mistake could you give me a correction?*

*Also, is there any significance in the fact that lines 1450 and 1460 are reversed, or is this a printing error?* – **Trevor R. Vaughan, Wood Green, London.**

● As we have said in the past, all listings published in *Electron User* are taken straight from working programs on disc and fed direct into the typesetting machine. Any errors likely to fall through the net are usually very obscure ones which even the author may not have come across after hours of play.

Please check the whole program as a typing error elsewhere might not be reported until line 810 is executed. No such variable means you've accidentally spelt something wrong somewhere.

However, you are quite right about lines 1450 and 1460. But even if entered in the order shown, they would still execute correctly as the function key would not be fetched from the buffer and executed until after the program ends at line 1460.

## Fun with codes

*I AM presently writing a spreadsheet program to suit my own requirements, but I don't know how to generate Ascii codes with Shift+Func and Shift+Control+Func, which can then be detected with GET or GET$.*

*The codes I require are from 150 upwards, and I have used *FX226, *FX227 and *FX228 which should change the base values for these function key combinations, but to no avail.* – **Andrew Wilson, Airth, Falkirk.**

● Unfortunately, the Electron's keyboard is completely different from the BBC Micro's, and the *FX calls you mention are implemented differently on the BBC's little cousin.

Instead of Shift+Function, use Func plus the keys A to P. For Control+Function use Func plus the keys Q to Z. There is no equivalent of Shift+Control+function.

These key combinations on the Electron are referred to as firm keys, and to set their bases to return the Ascii codes 150 upwards you should use *FX226 and *FX227 as on the BBC Micro, but note that *FX228

**Turn to Page 48 ▶**

## Starword or View – which is the best?

*I HAVE a couple of small problems which you may be able to solve. First, which is the better word processor – Slogger's Starword or View?*

*Second, when I stop work I often save my View file as DOC, and when I return I begin the next part and save it as DOC1. How can I load both DOC and DOC1 into the computer and save them as one file?* – **Andrew Wing, Hockley, Birmingham.**

● Answering your first question is rather difficult. Both word processors have their own merits, so it's up to you to decide which suits you best. Slogger's version is easier to get to grips with, while View tends to offer more advanced facilities, once you have spent time mastering it.

As to your second problem, we're not quite sure why you continue your work with a separate file. You could load in DOC, continue adding to it, and resave it as DOC again.

However, the solution to tacking two or more View files together is simple. Load in the first file – in your case DOC – and then type READ DOC1. View will then load DOC1 into memory at the end of the text already present.

This can be done for as many files as your computer has memory for.

◀ From Page 47

is not implemented. Type in the following:

```
10 *FX 226,150
20 G=GET:PRINT G
```

Now run it and press Func+A. You should have 150 stored in G and also printed on the screen.

**ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.**

**However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.**

**Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.**

# Accuracy not lost

*AARRGH! Joe Pritchard does it again. I thought someone might have put him right after his Hardware Projects article in the May 1987 issue of* Electron User *where he states: "*FX 190,n allows us to speed up the conversion time from 10mS to around 5 to 6mS. We do, however, lose a little accuracy . . .".*

**FX 190,8 does not lose any accuracy – you cannot lose what isn't there. The Plus 1 contains an eight-bit A/D converter, a National Semiconductor ADC0844 to be precise, a fact which is clearly stated in the Plus 1 User Guide on pages 1, 6 and 8.*

*Another misconception is from Chris Nixon who says that his excellent BOS editor (*Electron User *October 1986) cannot reside in pages 9 and 10 on tape based machines since it would be corrupted by the next SAVE or LOAD.*

*Not so. This area is not used by SAVE and LOAD, but by *SPOOL and *EXEC, as well as any operations involving opening cassette files.*

*I am sorry to sound carping, but people do rely on* Electron User *for information, so I believe you should get it correct. Incidentally, Roland Waddilove's Mandelbrot program (May 1987) can be speeded up 10 per cent or more by adding the lines:*

```
625 SE%
1385 CL%
```

*which disable interrupts during the calculation. –* **Phillip A. Bender, Sunderland.**

● Thanks for pointing out both Joe's and Chris's misconceptions. However, Chris was working using the information contained in the Advanced User Guide, which is unclear.

As for Roland's Mandelbrot program, he was surprised that he forgot to disable interrupts – normally a hardened habit of his.

He adds that as the Mandelbrot set is symmetrical about the horizontal axis, plotting could be speeded up by 50 per cent by just calculating the top half and duplicating a mirror image for the bottom: This will cut the time taken from around two hours to one hour.

This was only realised after the program had been published and it was too late to modify it. Perhaps you would like to modify it yourself? It shouldn't be too difficult.

# Basic guide

*DURING the past month I have been trying very hard to get hold of the Advanced Basic Rom User Guide for the Electron and BBC Micro. I have tried my local computer store, bookshop, and Watford Electronics without success, and I don't know who the publisher is. Can you help?*

*I buy your magazine monthly, and I think it is good value for money. –* **C. Grant, Birmingham.**

● If you mean the Basic Rom User Guide by Mark Plumley and published by Adder, Watford Electronics most certainly does stock it. There is also another Basic Rom User Guide by Colin Pharo, published by The Cambridge Microcomputer Center, 153-154 East Road, Cambridge.

# Electron users only

*IN the December 1987 issue of* Electron User, *you included a routine to speed up the cassette filing system, by shortening the gaps between data blocks.*

*As a BBC Micro user, I took the magazine home and typed it in. Apart from the warning "Electron OS 1.00 only", the utility seemed to work until I tried saving a program and received the message Data? 00 and so on.*

*This utility seems such a useful one to me, and I would really find it helpful if you could publish a conversion for the BBC Micro. –* **Jon Breen, Taunton, Somerset.**

● The warning message is there for a very good reason.

Although the Electron and BBC Micro are very similar, you just can't expect a complex routine like this one to run on what is esssentially different hardware.

The Turbo Loader is a very accurately timed piece of code, and as such would need a complete rewrite for the BBC Micro.

Although many *Electron User* games and utilities run on the BBC Micro, this is one of the rare ones that doesn't.

# Get rich quick!

*I WOULD be grateful for information concerning payment for programs accepted by* Electron User, *and for hints on the required format of submitted listings and articles. –* **Haydn Griffiths, Gt. Yarmouth, Norfolk.**

● We generally pay by the word. The actual amount can vary according to both the article and program quality, and the amount of editing needed to get the program and text up to scratch.

Programs would have to

# Free software galore!

*IN answer to Lee Harland's letter in the November 1987 issue: Yes, there is a free software library which is advertised in* Electron User *each month. It is the online database called MicroLink.*

*Connecting to this service has the added advantage of not having to laboriously type in the program listings each month.*

*But how do you connect to MicroLink? In fact, how do you attach a modem and communication package to the Electron? –* **Andrew Pickles, Brentwood, Essex.**

● Pace Miracle Technology offers a modem, RS423 interface and Commstar – everything you need to log on to MicroLink. You'll need a Plus 1 if you haven't already got one, and the price is £148.58. Contact Pace at: Pace Miracle Technology, Juniper View, Allerton Road, Bradford BD15 7AG, or telephone 0274 488211.

Alternatively, Slogger offers an RS423 and Commstar software. You'll need to add a modem to this.

be very good indeed to justify the top rate, so the average payment would be slightly less than this.

Send your articles in on disc if possible, otherwise tape will do.

And use a word processor such as Mini Office, View or Starword. However, if you can't, don't worry – send it on paper.

It is the programs themselves that must be supplied on tape or disc, with the format clearly marked on the cassette or disc itself. We can't type in listings.

Always mark all parts of a submission clearly with your name, address and telephone number if possible.

We can then get in touch to either return the work with suggested improvements, or post the payment.

Payment is always upon publication.

# The hare and the tortoise

*THE BBC Micro and Acorn Electron computers both use the same 6502A microprocessor, but for some reason the BBC Micro is twice as fast as the Electron. Why is this?* – **Andrew Bury, Kingswinford, West Midlands.**

● There are several reasons why the Electron is slower than its BBC Micro cousin. The first and most important, is that the BBC Micro uses many dedicated chips, like the 6845 CRTC video chip to refresh its screen ram. The Electron, on the other hand, leaves this work to the overburdened 6502 and ULA.

This means that in the higher screen memory modes – especially 0-2 – more processing time is wasted on this task, which can drop the overall processing speed by nearly 25 per cent.

To make matters worse, the 6502 can only access ram four bits at a time. This effectively slows all ram access from 2mHz to 1mHz – a drop of 50 per cent – leaving the Electron chugging away at roughly one third the speed of the BBC Micro in modes 0-2.

However, there are several ways around this problem. The easiest is to buy the superb Turbo board from Slogger, which jacks the Electron up to within a few per cent of the BBC Micro's speed.

Software techniques can help a great deal as well, for instance disabling interrupts from machine code when keyboard access is not required (see Philip Bender's letter opposite).

## Locked out

*I HAVE been reading your excellent magazine for some time now, and I wonder if you could help me with some problems I am having with my Electron?*

*How do you lock files? I have a short program to load in locked files, but am having trouble saving my own.*

```
  10 MODE 1:FOR N=0 TO 50
  20 DRAW RND(1200),RND(102
4):NEXT
  30 y=80:x=0:z=1
  40 PROCa(x,y):REPEAT
  50 UNTIL GET:GOTO 30
  60 DEFPROCa(x,y):FOR X=x
TO y STEP z:R1=80-X:R2=98-((
X/80)*49)+6:R3=32-((X/80)*32
):R4=54-((X/80)*17)
  70 VDU23;1,R1;0;0;0,23;2,
R2;0;0;0,23;6,R3;0;0;0,23;7,
R4;0;0;0
  80 NEXT:ENDPROC
```

*And can you explain why this Mode 1 screen shrinking program works perfectly well on the BBC Micro, yet does nothing what so ever on the Electron. Why is this?* – **Richard Moore, Blyth, Northumberland.**

● You just can't lock cassette files that easily. To explain here how to do it would enable a lot more people to write their own versions of your dubious file unlocker. Basically, just reverse the operation of your unlocker.

Your screen-squashing program relies on the presence of the BBC Micro's 6845 CRTC video chip. This is not present on the Electron, as the screen is driven by one Acorn custom ULA chip so the program won't work.

## DFS exposed

*I WISH to inquire if Mark Smiddy's very useful ADFS Exposed program in the November 1987 issue of* Electron User *could be adapted for use with ACP's E00 1770 DFS.*

*I have a number of discs now with all sorts of games and utilities requiring PAGE at &E00, and it would be very useful if I could check the disc status on those as well as my ADFS discs.*

*My configuration is an Electron and Slogger 64k/ Turbo board, Plus 1 with ACP ASR (in which the E00 DFS is fitted), Plus 3, and PMS second processor.* – **John D. Mosby, Glenfield, Leicester.**

● It is not possible to adapt the program easily as the DFS works in a completely different way to the ADFS.

However, *FREE will tell you the total free space in figures, and if you need to see where the spaces lie then *INFO *.* will help you.

As a DFS disc holds less information than an ADFS disc, and its layout is generally more comprehensible to the prying eye, a utility such as Mark's could be a slight case of overkill.

## Garbled graphics

*I RECENTLY bought an Epson P-40 printer and a First Byte printer interface. However, I don't seem able to understand how to get the printer to output in bit image mode.*

*I have experimented using VDU 1,27,75 which is ESC "K", but it seems to wait until the printer buffer is full before doing anything, and then it is printed all jumbled up.*

*Also, I have your Mini Office tape which I bought from your magazine and would like to say what a brilliant package it is.*

*Thanks are also due to Slogger, whose advice enabled me to get my P-40 – which has no printer buffer – to work with the Plus 1.* – **Brian Westgate, Barnhill, Dundee.**

● You are quite correct in choosing ESC "K", but you must give two parameters saying how much bit image data is being sent, low byte followed by high byte, followed by the data itself.

Furthermore, each byte in a VDU string must be preceeded by a one, which means send the next VDU code only to the printer. Try the following example, which should print 30 space invaders on your P-40:

```
10 MODE6:VDU2
20 FOR S%=1 TO 30
30 VDU1,27,1,75,1,8,1,0
40 RESTORE:FOR L%=0 TO 7
50 READ B%:VDU1,B%
60 NEXT:VDU1,32
70 NEXT:VDU1,13,3:END
80 DATA 49,122,220,244,244,2
28,122,49
```

## Snapshot taped

*I AM having some problems trying to use the Snapshot utility in the September 1987 issue of* Electron User. *It works fine with View, but when I try to use it with games loaded via Slogger's T2P4 rom, the system switches over to tape and saves the screens to tape.*

*Can you tell me how to get it to work as it should? There are no typing errors in the program, as I am using the listing from the October tape.* – **James Hymes, Millwall, London.**

● The T2P4 rom is designed to copy software from tape to disc. However, the cassette filing system will always be switched in while T2P4 is active. In addition to this, Snapshot is unlikely to work with commercial software: it will, however, work with your own and magazine listings.

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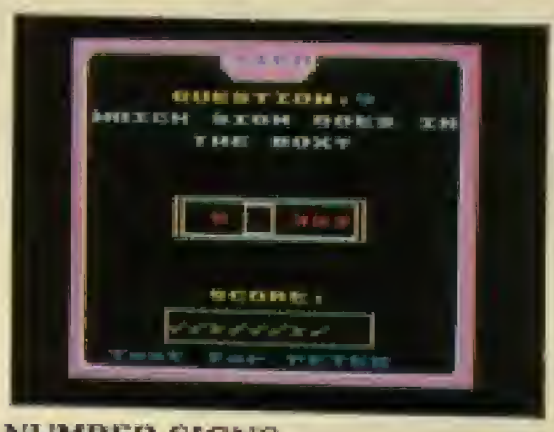


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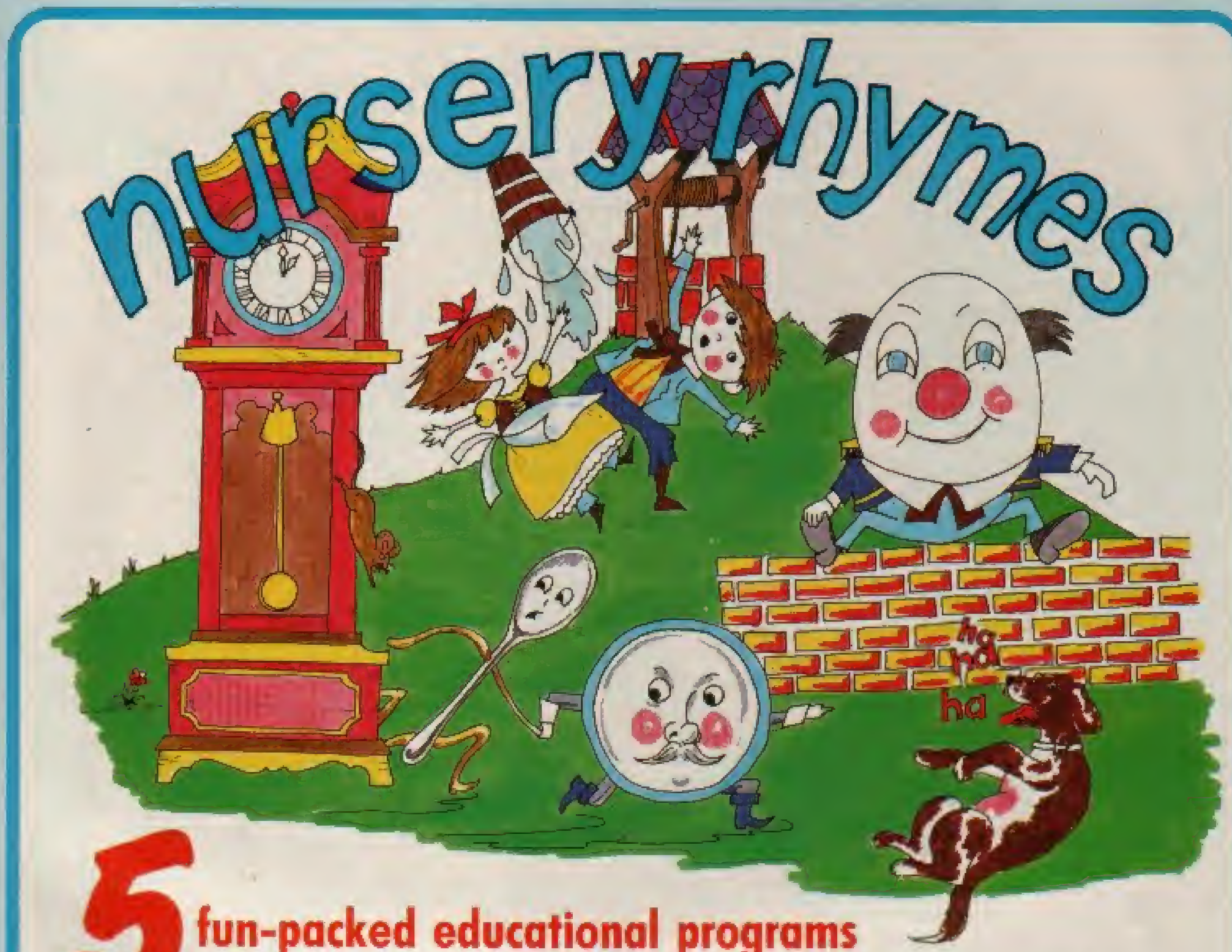


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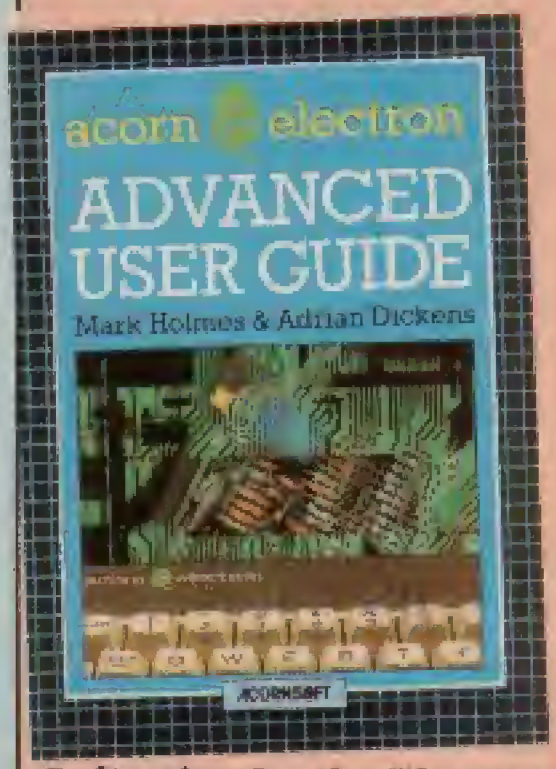


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# Measuring up

## BARRY WOOD shows how to get converted

**CONVERTING from one form of measurement to another is awkward when you can't remember the conversion factor and can't find it.**

This short utility provides you with a high-powered conversion program at your fingertips. It is easy to use and accurate. Type it in and save it, then run it – you should get a display like the one shown here.

When you run it you are presented with the different conversion units, metric on the left, imperial on the right. Arrows indicate the current selection, and at the bottom is the current conversion factor. At the top of each column block is a window – these are the data input and output areas.

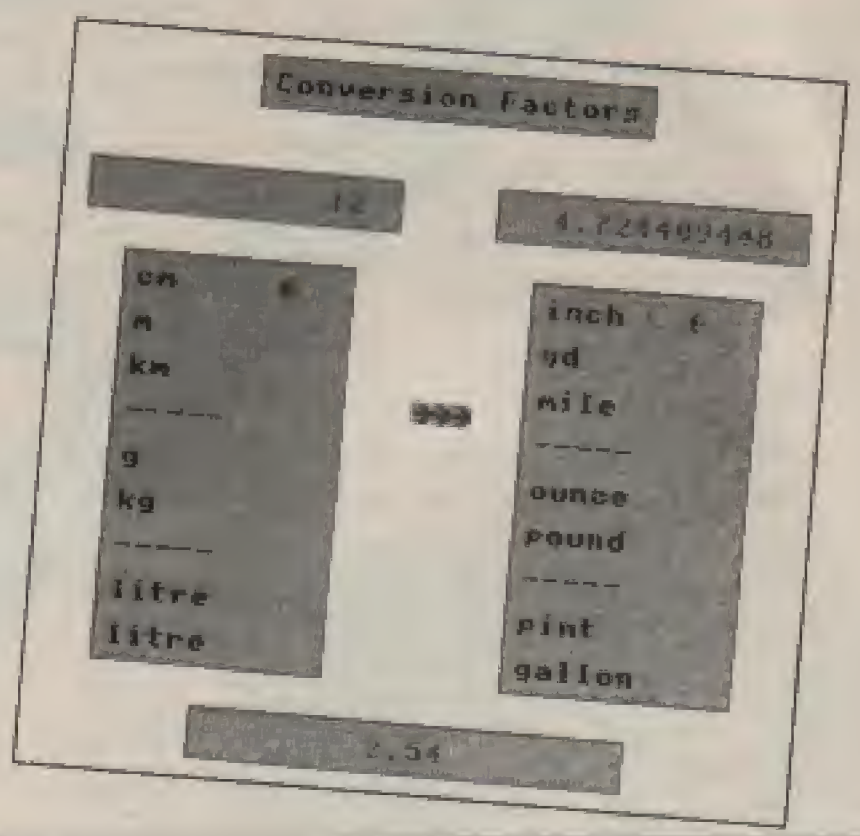
The spacebar alters the unit selection, the S key swaps columns and the < and > keys specify the direction of conversion.

For instance, to convert from grams to pounds first select the right-hand units with S and press the spacebar to move the pointer to pounds.

Press S to select the left-hand column and spacebar again to point to grams. Type in a number and press Return.

Now press > to indicate the direction of conversion and then the Copy key to find out the result. The value in pounds will be printed in the top window.

Note that some conversions are impossible – like litres to inches. These are indicated by an error message in the conversion factor box at the bottom of the screen.




```
   10 REM In Action
   20 REM Conversion Factors
   30 REM by Barry Wood
   40 REM (c) Electron User
   50 ON ERROR MODE6:PROCerr
:END
   60 MODE1:mX=&20205:PROCof
f:*FX4,1
   70 VDU&E017;&381C;&FF70;&
70FF;&1C38;
   80 VDU&E117;&1C38;&FF0E;&
0EFF;&381C;
   90 PROCbx("Conversion Fac
tors",1)
  100 FORX%=5TO25STEP20:PROC
b(X%,10,10,17)
  110 PROCb(X%-2,6,14,1):NEX
T:DIM f(9,9)
  120 PROCbx(STRING$(20," ")
,30)
  130 FORY%=1 TO 9:READa$,b$
  140 PRINTTAB(5,Y%*2+8)a$;TA
B(25,Y%*2+8)b$
  150 NEXT:FORX%=1TO9:FORY%=
1TO9:READ a$
  160 IF a$="*" f(X%,Y%)=-1:
ELSE f(X%,Y%)=VAL a$
  170 NEXT:NEXT:Z%=TRUE:Q%=0
  180 LY%=1:RY%=1:NL=0:NR=0
  190 REPEAT COLOUR 2:COLOUR
 129
  200 VDU31,19,15,225+Q%225+
Q%225+Q%
  210 PRINTTAB(4,6)FNf(NL);T
AB(24,6)FNf(NR);
  220 f=f(LY%,RY%):IF Q% f=1
/f
  230 IF f<0 f$=FNs(">>Error
<<") ELSE f$=FNs(STR$f)
  240 PRINTTAB(10,30)f$;:PRO
Cp(224):G%=GET:PROCp(32)
  250 I%=INSTR("<,>.",CHR$G%
):IF I%<1 ELSE Q%=I%<3
  260 IF G%=83 I%=NOTZ%
  270 IF G%<>32 ELSEIF Z% RY
%=FNic(RY%) ELSE LY%=FNic(LY
%)
  280 IF G%>&2F IF G%<&3A PR
OCnum
  290 IF G%<>&87 ELSEIF f=-1
 ELSEIF Q% NL=NR/f ELSE NR=N
L/f
  300 UNTIL FALSE:END
  310 DEF PROCp(C%):VDU31,12
,LY%*2+8,C%
  320 VDU31,32,RY%*2+8,C%:EN
DPROC
  330 DEF FNic(Y%)REPEATY%=Y
%+1:IFY%=10Y%=1
  340 UNTIL Y%<>4 AND Y%<>7:
=Y%
  350 DEF PROCnum:LOCAL X%,Y
%,V%,N
  360 Y%=6:IF Z% X%=4 ELSE X
%=24
  370 REPEAT N=N*10+(G%AND15
)
  380 PRINTTAB(X%,Y%)FNf(N);
  390 REPEAT PROCon:G%=GET:P
ROCoff
  400 UNTIL G%=13 OR G%=46 O
R (G%>&2F AND G%<&3A)
  410 UNTIL G%=13 OR G%=46:I
F Z% NL=N'ELSE NR=N
  420 IF G%=13 ENDPROC ELSE
V%=10
  430 REPEAT PROCon:G%=GET;P
ROCoff
  440 UNTIL G%=13 OR (G%>&2F
 AND G%<&3A)
  450 IF G%=13 ENDPROC
  460 REPEAT N=N+(G%AND15)/V
%:V%=V%*10
  470 PRINTTAB(X%,Y%)FNf(N);
  480 REPEAT PROCon:G%=GET;P
ROCoff
  490 UNTIL G%=13 OR (G%>&2F
 AND G%<&3A)
  500 UNTIL G%=13:IF Z% NL=N
 ELSE NR=N
  510 ENDPROC
  520 DEF FNf(N)=RIGHT$(STR$
(N+G%/100000000),12)
  530 DATA cm,inch,m,yd,km,m
ile,-----,-----
  540 DATA g,ounce,kg,pound,
-----,-----
  550 DATA litre,pint,litre,
gallon
  560 DATA 2.54,91.44,160934
.4,*,*,*,*,*,*,*
  570 DATA .0254,.9144,1609.
344,*,*,*,*,*,*
  580 DATA .0000254,.0009%,1
.61,*,*,*,*,*,*
  590 DATA *,*,*,*,*,*,*,*,*
  600 DATA *,*,*,*,28.35,450
,*,*,*
  610 DATA *,*,*,*,.02835,.4
5,*,*,*
  620 DATA *,*,*,*,*,*,*,*,*
  630 DATA *,*,*,*,*,*,*,0.5
7,4.55
  640 DATA *,*,*,*,*,*,*,0.5
7,4.55
  650 DEF FNs(t$):LOCAL L%
  660 t$=STRING$(8," ")+t$+$
TRING$(10," ")
  670 L%=LENt$0[V2:=M[0$(t$,
L%-10,20)
  680 DEFPROCbx(t$,Y%):LOCAL
 L%,X%
  690 L%=LENt$:X%=20-L%DIV2
  700 PROCb(X%,Y%,L%,1):COLO
UR 129
  710 PRINTTAB(X%,Y%)t$;:END
PROC
  720 DEFPROCb(X%,Y%,L%,D%):
LOCAL U%,V%
  730 U%=(X%+L%)*32:V%=(32-Y
%-D%)*32
  740 X%=X%*32:Y%=(32-Y%)*32
  750 PROCg(2,X%,V%,U%,Y%,20
)
  760 PROCg(1,X%,V%,U%,Y%,16
):ENDPROC
  770 DEFPROCg(C%,Q%,R%,S%,T
%,D%)
  780 VDU24,Q%-D%;R%-D%;S%+D
%;T%+D%;
  790 GCOL0,128+C%:CLG:ENDPR
OC
  800 DEFPROCon:LOCALB%:B%=1
  810 DEFPROCoff:LOCALB%:B%=
0
  820 VDU23,1,B%;0;0;0;0;:EN
DPROC
  830 DEFPROCerr:M%=10:PROCo
n:REPORT
  840 PRINT" at line ";ERL:E
NDPROC
```

# Feeling one degree under?

## ROLAND WADDILOVE presents a conversion routine in Part 2 of this series on Pascal programming

**IN this short series of articles we are examining the popular programming language Pascal, invented around 1970 by Niklaus Wirth.**

There are two different packages available on the Electron – ISO-Pascal, a rom-based version supplied on a cartridge ready to be plugged into a Plus 1 or Rombox, and S-Pascal, a cassette-based version.

The rom cartridge is the full implementation of the language (to the ISO standard), while S-Pascal is a much simpler, cut down (and cut-price) version. All the programs this month were written using S-Pascal, but they will also run under ISO-Pascal.

Last month Mike Plummer introduced the language, revealing a little of its history and basic structure. Essentially it was designed to teach good programming practice to students studying computer science and it is a highly structured language as we'll see.

It is a popular language, and although rarely seen on home micros, is in widespread use by professional programmers on much larger and powerful computers than our Electron.

This article is devoted to just one program – a short routine that will convert a temperature in degrees Fahrenheit to one in degrees Celsius. This shows quite clearly the beautifull structure of Pascal programs.

We'll write it in several different ways to show the wide range of commands available and their syntax. Program I shows it in its simplest form.

Notice that it starts with:

```
program temp(input,output);
```

This is the hallmark of all Pascal programs. It contains the program name, *temp*, and tells Pascal that information will be input and output – we are going to type a temperature in, convert it and print out the result. Most Pascal programs input and output information – if they sat there doing nothing they would be very dull indeed!

The next line is a list of the variables used in the program and their type. We are going to use *f* to hold the Fahrenheit temperature and *c* to store the Celsius temperature. They are both integers.

```
program temp(input,output);

var f, c : integer;

begin
 write('Enter temp:');
 readln(f);
 c:=5*(f-32) div 9;
 writeln('Celsius=',c)
end.
```

*Program I*

Logically, the labels *begin* and *end.* mark where the program begins and ends. The first thing it does is write "Enter temp:" on the screen. It then reads a number from the keyboard into the variable *f* using *readln(f)*. We could have used *read(f)* here, but *readln(f)* is better as it moves to a new line after the input.

The conversion from Fahrenheit to Celsius is carried out by:

```
c:=5*(f-32) div 9;
```

Notice that we use := to set a variable equal to a value, whereas in Basic we would use just an equals sign on its own. Also note that all statements except the last end with a semicolon. This is the statement separator and acts rather like Basic's colon.

Finally the new temperature is written to the screen and the program stops when it hits the *end.* on the last line.

> ' ... Pascal is in widespread use by professionals on much larger computers than our Electron '

Now we'll alter the program slightly, taking out the calculation from the main loop and placing it in a procedure called *ftoc*. This is called from within the main *begin – end.* structure:

```
program temp(input,output);

var f, c : integer;

procedure ftoc;
begin
 c:=5*(f-32) div 9
end;

begin
 write('Enter temp:');
 readln(f);
 ftoc;
 writeln('Celsius=',c)
end.
```

*Program II*

As you can see the procedure has been placed after the variables, but before the main *begin – end.* program loop. Procedures always come before the start of the program, unlike Basic which insists on them being placed at the end.

Pascal will skip all procedure definitions at the beginning of a program and will always start execution at the main *begin*.

Notice that the procedure

**Turn to Page 56 ►**

# Programming

◀ *From Page 55*

has its own *begin – end;* loop indicating where it starts and ends. It could also have its own variable list as well. It is called quite simply from the main loop by entering its name – *ftoc*.

Like Basic, we can pass parameters into procedures. Program II can be modified to produce Program III.

```
program temp(input,output);

var f, c : integer;

procedure ftoc(d:integer);
begin
 c:=5*(d-32) div 9
end;

begin
 write('Enter temp:');
 readln(f);
 ftoc(f);
 writeln('Celsius=',c)
end.
```

*Program III*

Here we are passing the Fahrenheit temperature in *f* to the procedure *ftoc*. Inside the procedure the local variable *d* is used.

Notice that in the procedure definition we must specify the type of the parameter passed. Pascal is very strict about variable types and ranges.

We have been using our procedure *ftoc* to calculate and return a single value, so why not use a function instead? Program IV shows how this may be done.

As a function returns a value, Pascal insists that we specify its type in the definition. In this case it is an integer. The value is returned by equating its name to the result of the calculation in the main body of the definition.

Apart from these two points, the program is no different from the last one.

```
program temp(input,output);

var f, c : integer;

function ftoc(d:integer):in-
teger;
begin
 ftoc:=5*(d-32) div 9
end;

begin
 write('Enter temp:');
 readln(f);
 c:=ftoc(f);
 writeln('Celsius=',c)
end.
```

*Program IV*

```
program temp(input,output);

var f : integer;

function ftoc(d:integer):in-
teger;
begin
 ftoc:=5*(d-32) div 9
end;

begin
 write('Enter temp:');
 readln(f);
 writeln('Celsius=',ftoc(f))
end.
```

*Program V*

However, it allows us to use the function call wherever we could use a number or variable. This enables us to shorten the last program.

The variable *c* in the last *writeln* has been replaced by the function call *ftoc*.

As these short programs show, Pascal is a highly structured programming language, forcing you to lay out your listings in a clear and easy-to-read manner. It encourages good programming practices.

● *We'll continue to look at this fascinating language next month when Mike Plummer will be back with some more complex examples.*

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# VIEWING YOUR BASIC LISTINGS

## ROLAND WADDILOVE shows disc drive owners how to edit programs using View

**MOST people tend to regard a word processor like Acornsoft's View as simply a tool for writing letters, documents and reports. While this is true, it is far more flexible than many people think, and there are a lot of other uses.**

In this article we'll look at how programmers can use View to create and edit Basic and assembly language programs – probably something they may not have thought possible.

In fact, using View in prefence to Basic's built-in editor has many advantages, as we will see.

To show how flexible View is let's start by entering a short program just as we would a letter or document.

First enter View either by pressing Control+Break or typing *WORD. We must tell View not to try to format or justify the program we are about to write, so enter:

```
SETUP I
```

to set just insert mode. Now press Escape to enter edit mode and type in the following short listing:

```
*BASIC
AUTO
REM Strip
MODE 6
PRINT
INPUT "Filename";a$
A%=OPENIN a$
B%=OPENOUT "Listing"
REPEAT
C%=BGET#A%
BPUT#B%,C%
IF C%=13 IF NOT EOF#A% FOR
I%=1 TO 5:C%=BGET#A%:NEXT
UNTILEOF#A%
CLOSE#0
PRINT "Finished"
```

Notice that I haven't used any line numbers – they aren't needed. This is where structured programmers have a big advantage over spaghetti programmers using lots of GOTOs.

Using View to write programs isn't really advisable if you use GOTOs to jump here, there and everywhere. And GOSUBs should be avoided if at all possible – they are just as awkward to cope with. Also notice that in this listing the first line is *BASIC and the second is AUTO.

What we're going to do is save the file to disc then *EXEC it back – while we're still within View.

The *BASIC command selects Basic and the AUTO generates the line numbers. To see this in action, enter command mode and type:

```
SAVE TEST
*EXEC TEST
```

and you'll see the program load and the line numbers automatically added. Press Escape when it has finished loading. You've now got the listing into Basic.

This is now a normal Basic program and you can edit it, run it, save it and so on, just as with any other Basic program.

If you need to make further changes you can either make them from Basic using the program in memory, or edit the file on disc using View. The advantage of having a View file is that you can easily modify it in ways not possible in Basic.

For instance, you can use View's search and replace functions to change variable names, block move whole sections of Basic programs, and so on.

Go back into View and re-load the program with:

```
*WORD
SETUP I
LOAD TEST
```

Now change the variable *A%* to *infile%* throughout the program with:

```
FOLD OFF
CHANGE A% infile%
```

The FOLD OFF command tells View not to match the case of the first item – *A%*. If you try this with FOLD ON, *infile%* will become *Infile%* as View changes the case of the i to I to match A.

You can save this modified program and *EXEC it back in as before. As you can imagine, changing the name of a variable throughout a long program could literally take hours in Basic, but in View it is a matter of seconds – an enormous saving in time and effort.

Why would you want to change the name of a variable? Well, it often helps to use long descriptive variable names when developing a complex program – they aid readability and help with debugging. These however, slow down program execution and greatly add to the length of the listing causing problems.

By writing the program in View you gain the advantage of long variable names, but can shorten them all with a handful of CHANGE commands before *EXECing it into Basic and running it. So you gain the best of both worlds – readable listings, but fast compact programs.

Converting a View file into Basic is easy, as we have seen. The reverse process of converting a Basic listing into a View file isn't quite so simple.

We need a Basic program in memory so *EXEC TEST into Basic, pressing Escape when it has finished loading. Now we'll try to convert it back to View – enter:

```
*SPOOL STRIP
LIST
*SPOOL
```

Now go into View, and load

**Turn to Page 58 ►**

```
FJ .....*.....*.....*.....*.....*.<
    *BASIC
    AUTO
    REM Simple machine code program
    DIM code% 100
    oswrch=&FFEE
    FOR pass=0 TO 2 STEP 2
    P%=code%
    [ OPT pass
      LDX #33
    .loop
      TXA
      JSR oswrch
      INX
      CPX #127
      BNE loop
      RTS
    ]
    NEXT
    CALL code%
    END

*****************************************
```

*Editing an assembler program using View*

# Feature

◀ *From Page 57*

the *SPOOLed file with:

```
*WORD
SETUP E
READ STRIP
```

This is how the program will look in edit mode:

```
>LIST
   10REM Strip
   20MODE 6
   30PRINT
   40INPUT "Filename:"a$
   50A%=OPENIN a$
   60B%=OPENOUT "Listing"
   70REPEAT
   80C%=BGET#A%
   90BPUT#B%,C%
  100IF C%=13 IF NOT EOF#A%
FOR I%=1 TO 5:C%=BGET#A%:NEXT
  110UNTIL EOF#A%
  120CLOSE#0
  130PRINT "Finished"
>*SPOOL
```

You'll see it starts with the prompt > then LIST, and is followed by the program, complete with line numbers. Finally, >*SPOOL follows at the end. To get back to the original listing in View we need to tidy this listing up a little.

The >LIST and >*SPOOL are easily deleted with Func+8 (delete line), but the line numbers are impossible to remove. You can't search for and replace them.

This is where the program Strip we have been experimenting with comes in. It's job is to strip the line numbers from a SPOOLed Basic program.

You've got it on disc, so *EXEC TEST to load it into Basic. Now run it.

You'll first be prompted for a filename, so enter STRIP the file you just spooled. The disc drive will start up and after a short while the message "Finished" will be printed on the screen.

Strip will still be there on the disc, but in addition there will also be a file called Listing – this is Strip with the line numbers removed.

```
*BASIC
AUTO
REM Machine Code
oswrch=&FFEE
FOR pass=0 TO 2 STEP 2
P%=&C00
[ OPT pass
  LDX #32     \ASCII " "
.loop
  TXA
  JSR oswrch  \print char
  INX         \next one
  CPX #127    \done all?
  BNE loop
  RTS
]
NEXT
```

Go into View as before and read it in. Chop off the >LIST and OL at the start and finish and you are left with your original program in View.

So far we've seen how to write Basic programs in View. Well, it is just as easy to write machine code files as well. Enter the following short assembly language listing above into View:

Save it with the name MCODE then *EXEC it into Basic. Press Escape when it has finished loading and run it. Now execute the machine code with CALL &C00 and you should hear a beep if all is well.

Although I have only discussed Basic and assembly language here, the technique applies equally well to other languages – particularly to Lisp which hasn't got any form of editor. It is far easier to write in View and *EXEC the file into Lisp.

As we've seen, View is more than just a simple word processor – it is a powerful program editor and development tool as well.

Try it, and you'll never go back to Basic's editor.


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# ODD ONE OUT

## Improve your child's perception with CHRIS NIXON's educational game

**ODD One Out is a game which can help children learn to group similar objects together, and reject any which don't match the group in a specific way.**

Teaching your children to group together objects that have something in common is a slow task, and is often aided by the use of games, puzzles and other easily followed teaching tools. But in order to avoid loss of interest, all such devices must have the added attraction of being fun.

The use of computers in homes and primary schools is enabling some of these educational tools to be converted into colourful, interesting programs which can be used in the home or classroom unsupervised – to an extent – by the parent or teacher.

The Electron has long been established in primary schools throughout the country, and was therefore an ideal vehicle for Odd One Out. Two players are required for this game; which will help stimulate discussion over the questions posed. There are only 30 questions, but the program only just squeezes into the Electron's memory as it is, and the use of colour – which helps to retain interest – and 40 column text would be lost if a higher-memory mode had been chosen at the outset.

Each player is first asked for their name – always important in childrens' games. Large letters are used here, and extensively throughout the game to aid with reading the messages.

The players can then sit back and wait while the playing board is drawn on the screen. This consists of two winnometers, which are wide horizontal bars, one above the other.

These gradually fill with yellow each time a player's question is answered correctly, and the player who reaches his win marker first is awarded one point, and both winnometers are then reset for the start of the next game.

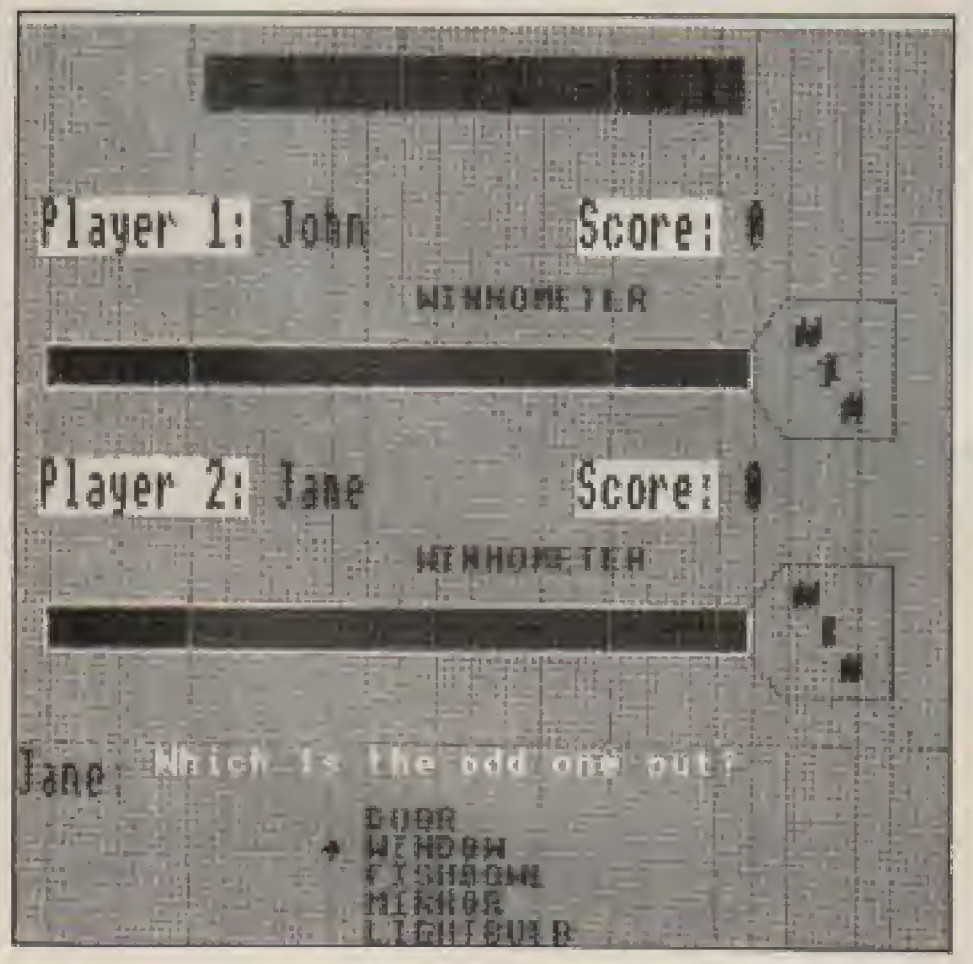
Each question takes the form "Freddy, which is the odd one out?" followed by a list of five objects. A pointer slowly moves down the list, and selection is made by pressing the spacebar while the pointer is over one of the choices. This is so children with limited coordination can participate in the game.

The 30 questions are held in data statements at the end of the program, and if you want to change them, the format is straightforward.

Four words or phrases which have something in common are seperated by commas, with a fifth word or phrase which is the odd one out inserted anywhere among them.

Then another comma and a sentence explaining what the other four have in common, and finally another comma and a number between 0 and 4 identifying which of the five items is the correct choice.

*Turn to Page 60 ▶*




### PROCEDURES

| | |
|---|---|
| **setup** | Set up arrays |
| **title** | Display title page |
| **drbd** | Draw playing board |
| **ask** | Ask a question |
| **qu** | Fetch a question |
| **yes** | Player got it right |
| **no** | Player got it wrong |
| **sc** | Update winnometer |
| **big** | Print double-height text |

### VARIABLES

| | |
|---|---|
| **P1%** | Player one's score |
| **P2%** | Player two's score |
| **sc1%** | Games won by player one |
| **sc2%** | Games won by player two |
| **qu$(30,5)** | Array of questions |
| **ans%(30)** | Array of answers |
| **maxq%** | Number of questions |
| **Q%** | Current question |

# Education

◀ From Page 59

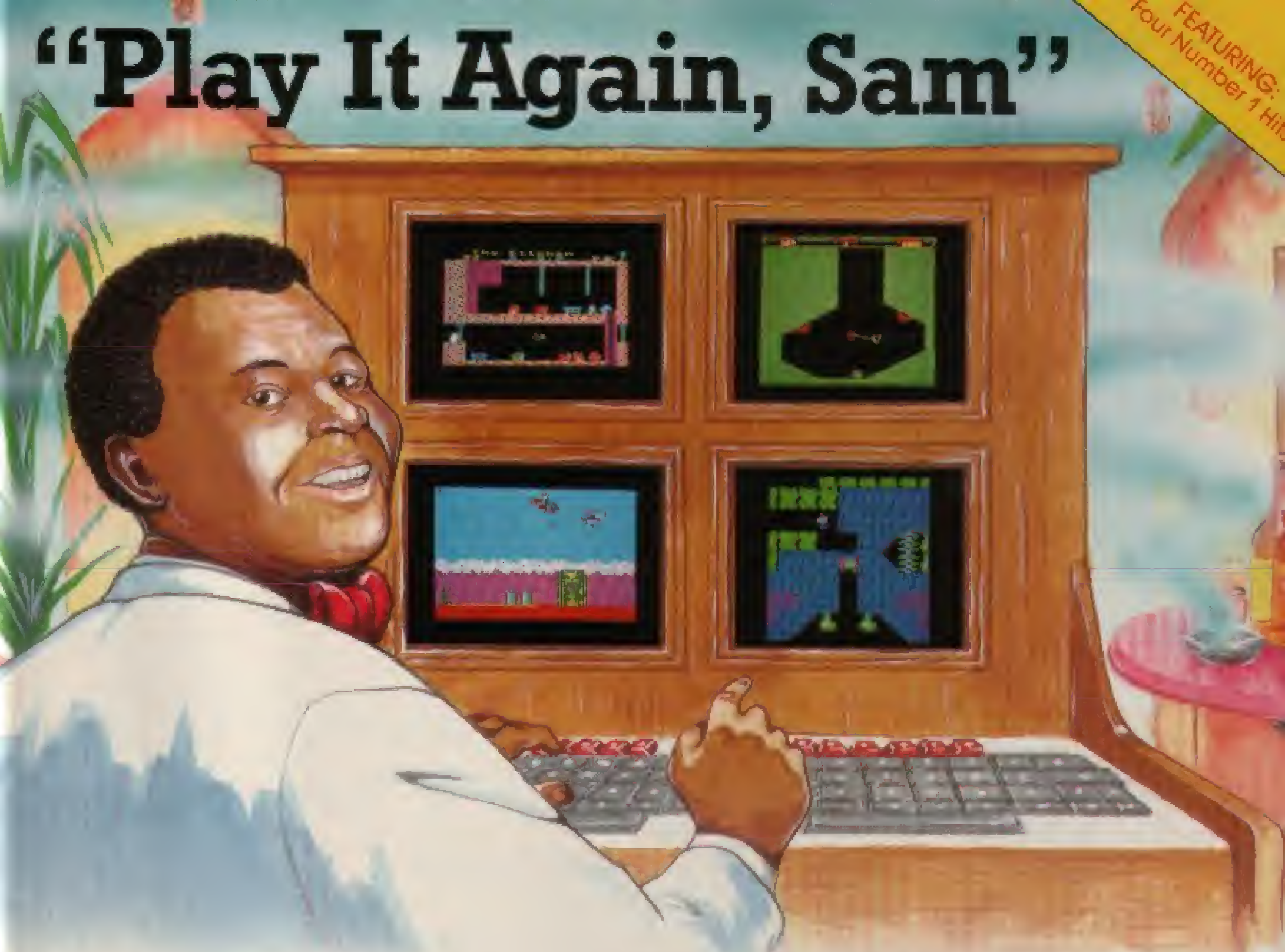
```
   10 REM ******************
   20 REM *   ODD ONE OUT   *
   30 REM * By Chris Nixon *
   40 REM *  (c) Electron   *
   45 REM *    User 1987    *
   50 REM ******************
   60 REM
   70 IF PAGE=&E00 THEN 120
   80 *FX21,0
   90 *K.0 *T.MFOR I%=0TO(TO
P-PAGE)STEP4:I%!&E00=I%!PAGE
:NEXT?MPAGE=&E00MOLOMRUNM
  100 *FX138,0,128
  110 END
  120 MODE1:*FX16
  130 PROCsetup:REPEAT:PROCt
itle
  140 MODE1:VDU28,1,20,38,1,
23,226,8,12,14,255,255,14,12
,8,19,0,4,0,0,0,23;8202;0;0;
0;:PROCdrbd:REPEAT:PROCask:U
NTILwin%=1:PROCsc:UNTILØ:UNT
ILØ
  150 DEFPROCsetup:maxq%=30:
P1%=0:P2%=0:sc1%=0:sc2%=0:pt
r%=0:lv%=0:P1%=8:ENVELOPE1,1
28,1,f,1,65,65,65,0,0,0,0,0,
0:DIMqu$(maxq%,5),ans%(maxq%
),done%(15):RESTORE:FORL%=1T
0maxq%:FORL1%=0TO5:READqu$(L
%,L1%):NEXT:READans%(L%)
  160 NEXT:ENDPROC
  170 DEFPROCtitle:CLS:COLOU
R129:COLOUR2:FORY%=2TO5:VDU3
1,6,Y%:PRINTSPC28:NEXT:VDU31
,7,3:PROCbig("E L E C T R O
N    U S E R"):VDU31,12,10:C
OLOUR128:COLOUR2:PROCbig("P
R E S E N T S")
  180 VDU31,9,16:COLOUR3:PRO
Cbig(""O D D   O N E   O U
T""):COLOUR128:COLOUR3:VDU3
1,13,22:COLOUR1:COLOUR131:PR
OCbig("By Chris Nixon"):VDU3
1,11,29:COLOUR129:COLOUR2:PR
INT"Press SPACE bar...";:REP
EAT UNTILINKEY(-99):*FX21,0
  190 VDU28,1,30,38,1:CLS:CO
LOUR131:COLOUR1:PROCbig("Pla
yer 1"):COLOUR128:COLOUR2:IN
PUT""What is your name ",P
1$:IF LENP1$>12 P1$=LEFT$(P1
$,12)
  200 PRINT'':COLOUR131:COLO
UR1:PROCbig("Player 2"):COLO
UR128:COLOUR2:INPUT''"What
is your name ",P2$:IF LENP2$
>12 P2$=LEFT$(P2$,12)
  210 ENDPROC
  220 DEFPROCbig(B$):LOCAL L
%,M%,X%,Y%:FORM%=1TOLENB$:X%
=0:Y%=&B:?&B00=ASC(MID$(B$,M
%,1)):A%=10:CALL&FFF1:L%=1:F
ORX%=224TO225:VDU23,X%:FORY%
=0TO3:VDU?(&B00+L%):VDU?(&B00
0+L%):L%=L%+1:NEXT:NEXT:VDU2
24,8,10,225,11:NEXT:ENDPROC
  230 DEFPROCdrbd:CLS:VDU31,
7,0:COLOUR129:COLOUR2:PROCbi
g(" O D D   O N E   O U T ")
  240 COLOUR131:COLOUR1:VDU3
1,0,5:PROCbig("Player 1:"):C
OLOUR128:COLOUR2:PROCbig("
+P1$):COLOUR131:COLOUR1:VDU3
1,23,5:PROCbig("Score:"):COL
OUR128:COLOUR2:PROCbig(" "+S
TR$sc1%)
  250 COLOUR131:COLOUR1:VDU3
```

```
1,0,14:PROCbig("Player 2:"):
COLOUR128:COLOUR2:PROCbig("
"+P2$):COLOUR131:COLOUR1:VDU
31,23,14:PROCbig("Score:"):C
OLOUR128:COLOUR2:PROCbig("
"+STR$sc2%)
  260 COLOUR1:PRINTTAB(16,8)
"WINNOMETER"TAB(16,17)"WINNO
METER":GCOL0,3:MOVE40,670:DR
AW1000,670:DRAW1000,620:DRAW
40,620:DRAW40,670:GCOL0,1:MO
VE44,666:DRAW996,666:PLOT 85
,44,624:PLOT 85,996,624
  270 GCOL0,3:MOVE40,380:DRA
W1000,380:DRAW1000,330:DRAW4
0,330:DRAW40,380:GCOL0,1:MOV
E44,376:DRAW998,376:PLOT 85,
44,334:PLOT85,998,334:MOVE10
20,670:DRAW1050,720:DRAW1200
,720:DRAW1200,570:DRAW1050,5
70:DRAW1000,620
  280 MOVE1000,380:DRAW1050,
430:DRAW1200,430:DRAW1200,28
0:DRAW1050,280:DRAW1000,330
  290 PROCshd("WIN",1070,700
,0):PROCshd("WIN",1070,410,0
):GCOL0,2:MOVE0,230:DRAW1279
,230:VDU28,0,31,39,25:ENDPRO
C
  300 DEFPROCshd(S$,XB%,YB%,
E%):VDU5:FORL%=1TO2:X%=XB%:Y
%=YB%:GCOLE%,L%:FORC%=1TOLEN
S$:MOVEX%,Y%:PRINTMID$(S$,C%
,1):X%=X%+32:Y%=Y%-40:NEXT:X
B%=XB%-8:YB%=YB%-6:NEXT:VDU4
:ENDPROC
  310 DEFPROCask:COLOUR128:C
LS:COLOUR2:PROCbig(P1$+":"):
COLOUR3:VDU9:PRINT"Which is
the odd one out?":PROCqu:PRO
Cip(1):IFrt% P1%=P1%-1:IFP1%
=10 win%=1:ENDPROC
  320 COLOUR128:CLS:COLOUR2:
PROCbig(P2$+":"):COLOUR3:VDU
9:PRINT"Which is the odd one
 out?":PROCqu:PROCip(2):IFrt
% P2%=P2%+1:IFP2%=10 win%=1:
ENDPROC
  330 win%=0:ENDPROC
  340 DEFPROCqu:COLOUR2:PROC
vd:FORL%=0TO4:PRINTTAB(1%,2+
L%)qu$(Q%,L%);:NEXT:ENDPROC
  350 DEFPROCvd:IFptr%=0 Q%=
RND(maxq%):PROCkeep:ENDPROC
  360 REPEAT:Q%=RND(maxq%):F
%=0:FORL%=0TOptr%:IF Q%=done
%(L%) F%=1
  370 NEXT:UNTIL F%=0:PROCke
ep:ENDPROC
  380 DEFPROCkeep:done%(ptr%
)=Q%:ptr%=ptr%+1:done%(ptr%)
=0:IF ptr%=maxq% ptr%=0
  390 ENDPROC
  400 DEFPROCip(P%):A%=0:X%=
13:Y%=2:REPEAT:VDU31,X%,Y%,2
26:TIME=0:REPEAT:A%=INKEY(-9
9):UNTILA% OR TIME>100:IF A%
 THEN 410 ELSE VDU31,X%,Y%,3
2:Y%=Y%+1:IF Y%=7 Y%=2
  410 UNTILA%:IF P%=2 THEN 4
30 ELSE R%=Y%-2:IF R%=ans%(Q
%) rt%=TRUE:PROCyes(1) ELSE
rt%=FALSE:PROCno
  420 ENDPROC
  430 R%=Y%-2:IF R%=ans%(Q%)
 rt%=TRUE:PROCyes(2) ELSE rt
%=FALSE:PROCno
  440 ENDPROC
  450 DEFPROCyes(P%):CLS:COL
OUR129:COLOUR2:VDU31,12,3:PR
OCbig(" C o r r e c t ! "):F
ORL%=50TO150STEP5:SOUND1,-10
,L%,1:NEXT:IF P%=2 THEN 460
ELSE GCOL0,2:MOVE44+P1%*95,6
24:DRAW44+P1%*95,666:PLOT85,
44+P1%*95+95,624:PLOT85,44+P
1%*95+95,666:ENDPROC
  460 GCOL0,2:MOVE44+P2%*95,
334:DRAW44+P2%*95,376:PLOT85
,44+P2%*95+95,334:PLOT85,44+
P2%*95+95,376:ENDPROC
  470 DEFPROCno:CLS:COLOUR13
0:COLOUR1:VDU31,14,0:PROCbig
(" W r o n g ! "):FORL%=150T
050STEP-5:SOUND1,-10,L%,1:NE
XT
  480 COLOUR129:COLOUR2:PRIN
T""qu$(Q%,ans%(Q%));:COLOUR
128:COLOUR3:PRINT" was the o
dd one out,
  490 COLOUR129:COLOUR3:PRIN
T"because the others ";qu$(Q
%,5); . :COLOUR2:PRINT"Pres
s SPACE bar...";:REPEATUNTIL
INKEY(-99):ENDPROC
  500 DEFPROCsc:IF P1%=10 sc
1%=sc1%+1:FORL%=1TO4:SOUND1,
1,1,20:NEXT:FORSD%=1TO14:PRO
Cshd("WIN",1070,700,3):NEXT
ELSEsc2%=sc2%+1:FORL%=1TO4:S
OUND1,1,1,20:NEXT:FORSD%=1TO
14:PROCshd("WIN",1070,410,3)
:NEXT
  510 P1%=0:P2%=0:ENDPROC
  520 DATA DOG,CAT,MOUSE,PEN
CIL,WHALE,"are animals",3
  530 DATA "OAK TREE","COUNT
RY","ASH TREE","CHERRY TREE"
,"CEDAR TREE","are trees",1
  540 DATA RED,GREEN,BLUE,YE
LLOW,HOT,"are colours",4
  550 DATA TABLE,CHAIR,BED,D
OG,WINDOW,"are furniture",3
  560 DATA BOOK,ROSE,TULIP,D
AFFODIL,MARIGOLD,"are flower
s",0
  570 DATA POTATO,CARROT,TRE
E,SWEDE,TURNIP,"are vegetabl
es",2
  580 DATA ARM,LEG,HEAD,FOOT
,SHIRT,"are parts of a body"
,4
  590 DATA SOCKS,ARM,TROUSER
S,SHIRT,JUMPER,"are clothes"
,1
  600 DATA APPLE,PEAR,ORANGE
,CHOCOLATE,GRAPE,"are fruit"
,3
  610 DATA JOHN,PETER,JANE,S
ALLY,DOOR,"are people's name
s",4
  620 DATA FLY,ANT,FOOTBALL,
WASP,BEE,"are insects",2
  630 DATA LAKE,HEDGE,SEA,RI
VER,STREAM,"are made of wate
r",1
  640 DATA GOOSE,HEN,SWAN,FO
OT,DUCK,"are birds",3
  650 DATA COD,SHARK,SALMON,
GOLDFISH,BOWL,"are fish",4
  660 DATA TABLE,TEA,COFFEE,
ORANGE,BEER,"are drinks",0
  670 DATA BIG,LITTLE,GREEN,
TALL,SMALL,"are about size",
2
  680 DATA SPOON,FORK,PLATE,
KNIFE,KETTLE,"help with eati
ng",4
  690 DATA GARDEN,BEDROOM,LO
UNGE,KITCHEN,"DINING ROOM",
"are rooms in a house",0
  700 DATA METRE,MILE,CENTIM
ETRE,LITRE,KILOMETRE,"are me
tric units",1
  710 DATA BUCKET,TANK,HOSE,
TAP,RADIO,"are water users",
4
  720 DATA DOOR,WINDOW,FISHB
OWL,MIRROR,LIGHTBULB,"are ma
de of glass",0
  730 DATA RADIO,CLOCK,TELEV
ISION,LAMP,TELEPHONE,"use el
ectricity",1
  740 DATA BARREL,BOX,CHAIR,
SUITCASE,BAG,"can hold objec
ts",2
  750 DATA PENCIL,BIRO,RULER
,QUILL,FELT-TIP,"you can wri
te with",2
  760 DATA CHEDDAR,BACON,STI
LTON,CHESHIRE,EDAM,"are all
cheeses",1
  770 DATA IRON,STEEL,PLASTI
C,BRONZE,COPPER,"are metals"
,2
  780 DATA CUP,SAUCER,MUG,GL
ASS,TUMBLER,"are drunk out o
f",1
  790 DATA HUT,BUNGALOW,COTT
AGE,SHOP,FLAT,"are places to
 live",3
  800 DATA SHOES,SANDALS,SLI
PPERS,TRAINERS,GLOVES,"are f
ootwear",4
  810 DATA LONDON,ENGLAND,FR
ANCE,ITALY,SPAIN,"are countr
ies",0
```

***This listing is included in this month's cassette tape offer. See order form on Page 53.***

# "Play It Again, Sam"

FEATURING: Four Number 1 Hits



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Sam, an ardent fan of Superior Software's games, is always ready for a challenge... and the tougher the better! Here's four games that, as time goes by, he returns to again and again.

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Thrust is simple and fun-to-play, yet incredibly realistic and highly addictive.
"This game has class...try it!" urged Computer & Video Games.

Stryker's Run is a challenging action-packed combat game.
"This game will impress you...the graphics are stunning...this should be in every collection," A & B Computing remarked.

Ravenskull is a massive arcade-adventure game, full of puzzles and problems to be solved.
Acorn User commented: "Ravenskull is a very good game and is destined to become another Superior classic."

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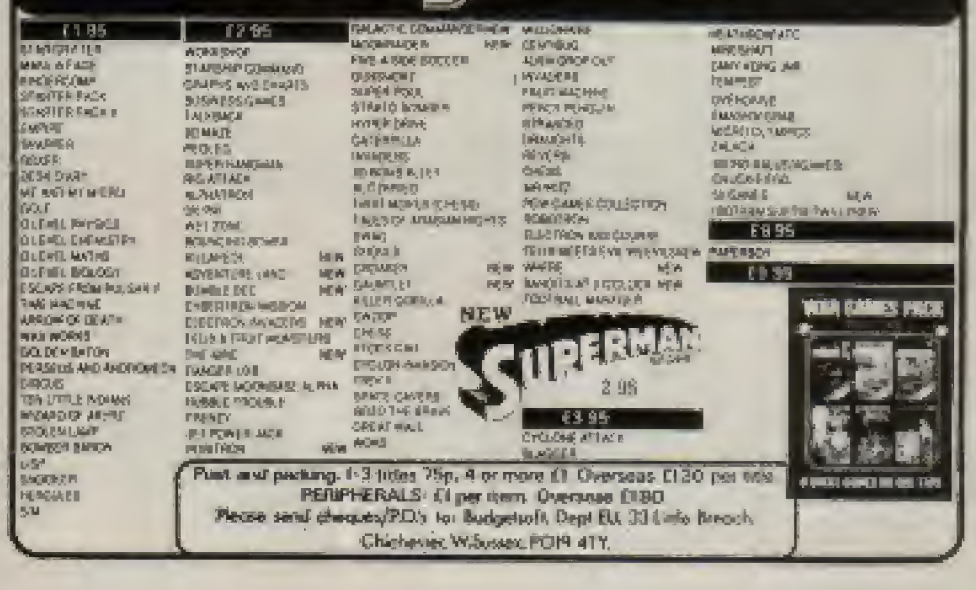


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